

# Francois Péron's Natural History of Maria Island, Tasmania



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## ABSTRACT

During a three-day circumnavigation of Maria Island in February, 1802, Francois Péron, zoologist with the expedition commanded by Nicholas Baudin, made observations on the meteorology, geomorphology, geology, botany and zoology. His observations on the rock types were factual and comprehensive but his interpretations depended on the Wernerian geognosy and are no longer considered valid. He paid particular attention to the marine life on the shores of and in the seas around the island, recorded many species (prior to European settlement), and, more significantly, made the first ecological deductions on the Tasmanian biota. The map constructed from the survey made by Boullanger during the circumnavigation was much better than the existing maps but shows distortion due to failure to recognise a consistent current set.

## INTRODUCTION

Francois Péron, one of the zoologists embarked upon Nicolas Baudin's expedition to the Southern Lands in 1800-1804, and the only zoologist to survive it, was born at Cérilly in central France on 22 August 1775. He received a good education, but fired by the enthusiasm of the proclamation of the Republic in 1792, he volunteered for military service, from which he returned home three years later, at the age of twenty, having lost his right eye. A year later he became a medical student, and also took courses in zoology and comparative anatomy, graduating brilliantly, and shortly afterwards offered himself to Jussieu, the professor-director of the Museum of Natural History in Paris, for the expedition to New Holland which was then in preparation. In point of fact, Péron's application was for the position of anthropologist, but was not granted and he was appointed one of the zoologists. His work in that capacity can be seen to be outstanding, and much superior in standard to his anthropological researches, which suffered partly because of preconceived ideas but mainly because he could not treat his human subjects with the scientific precision he gave to the rest of the animal kingdom.

The expedition sailed from Le Havre on 19 October 1800. Under Baudin's command were the corvettes *Géographe* and *Naturaliste*; a third vessel, the schooner *Casuarina*, was bought when the expedition reached Sydney in 1802. Among those who sailed with the expedition were Pierre Boullanger (engineer-surveyor), Jean-Marie Maurouard (midshipman), Charles-Alexandre Lesueur and Nicolas-Martin Petit (assistant gunners; employed as artists). A number of 'savants' (scientists) also sailed, including Francois Péron and Réné Maugé (zoologists), Louis Depuch and Charles Bailly (mineralogists), and Anselme Riedle (head gardener; died at Timor in November 1801).

The instructions given by the Comte de Fleurieu to Baudin concerning natural history studies during the voyage, were that he was to examine in detail the coast of New Holland, determine precisely geographical positions, study the inhabitants, the animals and other natural productions, and collect useful animals and plants which could be introduced into France.

The expedition reached Tasmanian waters, in D'Entrecasteaux Channel, on 13 January 1802 and remained in the area for a month, after which it worked along the east and north-east coasts of Tasmania before sailing for Sydney. Subsequently the expedition sailed through Bass Strait and spent some time at King Island and in the Robbins-Hunter Islands complex.

The *Géographe* and *Naturaliste* reached Maria Island from the Derwent Estuary late on 18 February 1802, anchoring about 4 km off Point Maugé; and left on 27 February. On 19 February Baudin sent off a longboat with Boullanger, Maurouard and Péron to make a plan of Maria Island, and to check up on the map of the island prepared by Captain John Cox in 1789. The party circumnavigated the island travelling anti-clockwise, that is, first the west coast was surveyed between Point Maugé and Cape Péron, then the east coast, and lastly the west coast between Cape Boullanger and Point Mauge. On the way up the east coast Riedle Bay was visited, and there Péron discovered an Aboriginal tomb near Cape des Tombeaux. The party returned to the ships on 21 February. During the circumnavigation the weather, according to the meteorological records kept on the *Géographe*, was fine and calm, with day time temperatures ranging from about 12° to 15°.

The observations on Maria Island, the subject of this paper, are of special interest because they were used on the one hand to exemplify a general view, then current, of the origin and relationships of rocks and, on the other hand, to relate plants and animals to their environment, thus breaking new ground (certainly in the Tasmanian context) and hinting at the future science of ecology. Also of interest are the observations of the fauna and flora in a pre-European settlement state.

#### THE PROGRESS OF STUDIES IN THE NATURAL SCIENCES

The long history of discovery began for the natural sciences in the ancient world with the treatises of Pliny and others. With the decline of the civilisations of Greece and Rome in western Europe, such works were taken over by the Europeans as accepted fact and were followed without question. Derived from them and from the tales of travellers, which were subjective rather than objective, there developed the bestiaries and herbals of the Middle Ages and earlier, works having a moral interest in Nature rather than its scientific study. From the late Middle Ages there slowly developed the Renaissance idea of naturalism, a viewpoint which had been stimulated by the riches brought back to Europe by the discoveries in the New World. At the same time, the new discoveries in astronomy, mathematics, anatomy, microscopy and physiology were not only adding to factual knowledge but were serving as stimuli for an interest in all branches of science.

By the seventeenth century it had become the mark of a gentleman to have a collection of objects of natural history, mineral specimens, fossils, dried plants and parts of animals. It was a hobby which was to become the basis for the great Royal collections, later to develop into the National Collections of today, enriched by those of many benefactors from their private collections.

So great was the interest in collecting objects of natural history that kings and the rich could equip expeditions to search for new species for their collections or to be grown in the botanical gardens which were a feature of their estates. In making such collections, especially those made by kings, there was not only the stimulus of private pleasure but a national interest in their usefulness. Thus, the search for new animal species was directed towards improvements in animal husbandry, and the search for new plants towards their use in agriculture, in industry and as drugs in medicine. It must be remembered in this regard that Nicolas Baudin had been such a collector, in the West Indies principally, before he was chosen to lead his expedition to the Southern Lands, and his success there was a basic reason for selecting him for this leadership.

Of course, nothing develops freely in isolation, and exploration with the acquisition of scientific data in view was the outcome of trading. In its history trading had involved at first near neighbours, then more distant peoples. To cover distances meant the formation and regulation of trade routes by land and by sea, and the marine voyages not only depended for their success upon the construction and sailing of ships but the determination of their whereabouts when out of sight of land, and this required the development of suitable measuring instruments and astronomical observation, the latter themselves the stimuli for progress in those sciences.

The traders of Western Europe especially came to seek new countries and people with whom to trade, and so there developed slowly the voyage of discovery. With the opening up of the Americas to Western Europe in the sixteenth century, there remained only one extensive region of the world which was but little known, the Pacific. The importance of this region was made clear by Charles de Brosses in his *Histoire des navigations aux Terres Australes* in 1756, and for de Brosses the opening up of the Pacific was not just a matter of commerce and the occupation or influence upon the lands of the native races of the region, but an opportunity to study the way of life of such peoples and the natural history of the territories they occupied. He stressed the view that scientific observation should be of concern to the explorer. This view of exploration received another stimulus from a developing astronomical science which was organising expeditions to many parts of the world to observe the transits of Venus in 1761 and 1769. These expeditions were relevant to the Pacific region because the astronomer Le Gentil, visiting India to observe the 1761 transit but failing to get there in time, remained in the region until he could observe the 1769 transit, in the meantime devoting himself to the study of the peoples and natural history of a region extending from Madagascar to the East Indies and the Philippine Islands; and in 1769 James Cook entered the Pacific Ocean to observe the second of the transits at Tahiti.

The effort put into collecting animals and plants would have been of little permanent value without some means of describing them which was not subjective, hitherto the basis of the accounts of the natural wonders of this place or that. This became possible when Linnaeus published in 1735 a system of binomial nomenclature based upon the stable characters of organisms. Animals and plants could now be named in such a way that not only could forms having the same characteristics be recognised but newly discovered organisms could be identified in relation to the known, and hitherto unknown forms assigned to a place in a hierarchy. This latter made possible the study of evolution, which had long formed a basis for philosophical discussion but which could never be tested because of the absence of data which was based upon scientific principles.

It remains to say something of the beginnings of scientific exploration. Under the influence of the search for rare specimens by the rich, the researches of Linnaeus and de Brosses's book, explorers began to number scientists among those who accompanied them. In the Pacific world our interest becomes concentrated upon the marine explorations. One of the earliest of those explorers to have scientists in their company was Bougainville, who in his voyage to the New Guinea region in 1768 had the botanist Philibert Commerson as one of his staff. From that time most explorers of the Pacific carried scientific staffs, and here we find a clear divergence of British and French practices, the British taking private individuals whose principal interest was in some particular branch of natural science, as for example Joseph Banks who accompanied James Cook on his first voyage and whose collections were his own property; while the French sent teams of scientists with their expeditions, whose collections were to enrich public museums, a notable exception being that amassed by Labillardière as botanist with the D'Entrecasteaux expedition, to which was added those of Leschenault, the botanist of the Baudin expedition, and others. The British continued their tradition of the gifted civilian as late as Darwin's voyage in the *Beagle*, relying on their naval surgeons for the generality of scientific recording in the natural sciences, as for example Cook in his third voyage relied on Surgeon William Anderson, and Ross with the *Erebus* and *Terror* in the early 1840s relied on his surgeons for research in the natural sciences. The French only modified their procedures to the extent of giving up the recruitment of civilian scientists after 1815 and using naval scientists in their place because it had been found that the presence of civilians on naval ships was detrimental to their security.

#### FRANCOIS PÉRON: HIS SCIENTIFIC BACKGROUND

In the last five years of the eighteenth century, when Francois Péron was studying the natural sciences at the Museum of Natural History in Paris, that institution, already long famous

for the quality of its researches in the natural sciences and staffed by the leading biologists of France, provided the training which would equip those attending its courses with a wide outlook on biology; and as well its staff could and did engender enthusiasm for research.

At this time the renowned Georges-Louis Buffon (1707-1788) was not long dead. He will long be remembered for his *Histoire naturelle, générale et particulière* which began to appear in 1749 and at the time of his death had run into thirty-six of a proposed fifty volumes — after his death others continued his work. In 1739 Buffon was appointed Keeper of the Jardin du Roi (King's garden) and director of the Museum of Natural History in Paris. He was an all-rounder, equally at home with mathematics as with the natural sciences, with zoology as his particular interest, but he was also much concerned with geology and evolutionary ideas. Buffon's *Histoire* was the first book to present the isolated and apparently disconnected facts of natural history as a co-ordinated whole.

Two outstanding figures at the Museum of Natural History in Paris at the end of the century were Georges Cuvier (1769-1832) and Jean-Baptiste de Lamarck (1744-1829), the former Professor of Comparative Anatomy and in charge of zoology and vertebrate palaeontology, and the latter also a Professor of the Museum, a botanist and zoologist and in charge of invertebrate palaeontology.

Both Cuvier and Lamarck, and especially the latter, believed firmly in the role of the environment in controlling the way of life of an organism, and both had views, though differing in emphasis, on the importance of the environment in evolutionary processes. Cuvier held the view that animals changed only after a catastrophe had occurred, when new species developed from forms which had been sheltered in small regions untouched by the upheaval; he thought that species change did not need very long periods of time to occur.

Lamarck was a man of brilliant intuitions. He firmly believed in the interdependence of organism and environment. He made clear his view that organisms varied by saying that 'only individuals exist in nature'. As for species change, he believed that life was generated spontaneously from gelatinous or mucilaginous matter, and that evolution did not occur as a result of colossal universal catastrophes which changed the distribution of land and sea. Indeed, the earth had had a slower and more continuous history over a very long time, the extinct species revealed in fossils changing very slowly into the corresponding living species. This he explained by the inheritance of acquired characters, altered wants (environments) leading to altered habits, the organs of animals being enlarged or diminished according to the degree to which they were put to use, all this supposed to act through the nervous system.

The end of the eighteenth century was a time of great interest in evolution. The ideas of the ancients were purely philosophical, and although those ideas had elements of truth in them, such as those of Lucretius, who wrote about the nature of the universe, they entirely lacked a factual basis. The Old Testament postulated a special and almost instantaneous creation by God, and the advent of Christianity did nothing to change this, if anything binding such a belief into a strait jacket of what could be believed in and what could not, by decree of the Church. By the eighteenth century, however, the idea of a special creation by God was being questioned and various theories were advanced which offered alternatives. Thus, Erasmus Darwin (1731-1802) brought forward in his *The temple of nature* (1803) ideas which were to be found in the future to be a correct explanation of the processes of evolution. In 1809 Lamarck advanced his theory that evolution took place by the hereditary transmission of acquired characters. However, until Charles Darwin produced definite evidence for his theory of evolution by natural selection, all ideas about evolution were little more than unsupported theories because they lacked satisfactory evidence for it, and in truth only differed from the philosophical discussions of the ancients in that they now dealt with the organism in a state of nature.

Lamarck's theory of the causes of evolution still receives a little attention, though it is small enough, because of the findings concerning the induction of change in certain micro-organisms, but it is now considered as little more than one of the movements in the past history of evolution. After all, for any theory to be sustained it must have the backing of fact, and even Darwin's theory did not become firmly established until the discovery of the gene.

It is likely that Péron found himself closest to Lamarck in his attitude to biology. Both men firmly believed in a strong relationship between the organism and its environment, both

non-living and living. Pérón's Maria Island study exemplifies this.

It must be added, however, that once Pérón began to consider man, in the person of the Tasmanian Aborigines, all his good biological principles and scientific precision deserted him.

Pérón had wide interest — in his *Voyage* there are reports on the colonial tunicate *Pyrosoma*; the temperature of the sea, at the surface and at depths, and an apparatus for measuring this; the zoology of the Southern Lands; the preservation of zoological specimens; and memoirs on dysentery and the use of betel, and on marine mammals. In his account of the natural history of Maria Island we find other evidence of his versatility. It must be remembered, however, that Pérón lived at a time when many scientists were conversant with a wide variety of disciplines, so that we find, for example, that Claude-Antoine Riche, the botanist/zoologist who accompanied D'Entrecasteaux in 1791-1794 on his voyage in search of La Pérouse, gathered data on geology and mineralogy, carried out the analysis of soils and the salt content of seawater, studied phosphorescence, the temperature and pressure of the atmosphere above the sea, at its surface and at depths, and so on. The scientist of those times was not so overloaded with a vast detail in his chosen specialty, so that he had to restrict himself to it, a feature of science today which is detrimental to its advancement.

It is greatly to be regretted that the collections brought back to France by the Baudin Expedition and, except for the dried plants and seeds, deposited in the Museum of Natural History in Paris — and the living plants and animals mostly in the Jardin des Plantes — received so little attention from scientists. The quantity was huge, well over 200,000 specimens, as much as the Museum had received up to that time from all other sources, but apart from a few descriptions of new mammals and some work by von Buch on the rock specimens, little became known through publication. The collections became lost as it were, and even today are hardly known, with Pérón's *nomina nuda* so much waste.

#### BRIEF NOTE ON PÉRON'S LITERARY STYLE

Pérón was a man of boundless enthusiasm for his scientific research, and this enthusiasm is all-pervasive in his writing. It produced a precise and detailed approach in his numberless observations and the recounting of them. It also produced an exuberant literary style which, while ringing quaintly in modern ears, is both vivid and endearing. Thus, the same writer who described with scientific detachment and conciseness the nature of the soil and rocks of Maria Island in his Mineralogical Observations can, a few paragraphs later, produce such coloured prose as "everything recalls the painful struggle that it (the world) had to carry on against the fury of the waves; everything speaks of their ancient dominion over the land..."

But perhaps the most illuminating passage of the whole work on Maria Island is the one in which Pérón describes the favourite haunts of the cormorant (para. 76). Here, he manages to combine a number of legitimate ornithological observations with a most dramatic evocation of an awe-inspiring scene. This is the real Pérón, and here, indeed, his true literary style is revealed for all to see.

#### SCIENTIFIC EQUIPMENT FOR THE BAUDIN EXPEDITION

It would be of much interest to know something about the physical conditions under which the scientists and others worked on board the frigates, but there does not seem to be any information about this. Conditions must have been so cramped on board that people worked wherever they could, perhaps using a cabin as a common storeroom for all their apparatus and supplies, and themselves working on their collections and writing their reports in any place they could find.

It is also hard to find out much about the equipment and apparatus the several scientists had at their disposal. There are lists of the supplies provided for them, but little definite

information as to the equipment they had. Thus, no references have been found to microscopes and magnifiers for the use of those engaged in the study of natural history, although it is likely they had them because such equipment had been supplied for the D'Entrecasteaux Expedition ten years earlier (Richard, 1986), an expedition which had been well equipped for the activities it engaged in. There is no reason to think, therefore, that the Baudin Expedition was less well equipped. (Ref.: Archives Nationales, Paris, Baudin Archive, series BB4 995 and 996 and 5JJ 24).

The records of equipment and supplies range from those which provide a detailed view to those which contain little information. There are detailed lists of the instruments of navigation and astronomy, these including thermometers, barometers and hygrometers as well as the chronometers and instruments for determining latitude and longitude; but there is almost nothing about the equipment provided for those concerned with the natural sciences. Thus, the Regnier dynamometer which Péron brought from Paris (Plomley, 1989) is not recorded on any list of equipment. There is also no mention of the apparatus for measuring the temperature of the sea at various depths (Péron and Freycinet, vol. 2, chap. 36 and plate), but this was because it was devised by Péron and Lesueur and made up on board — it seems that after their return to Paris in 1804 an instrument maker made up a more robust instrument.

There are some lists of supplies provided for the natural scientists. Those for the gardeners included spades, axes, hatchets, watering pots, syringes and thermometers; those for the zoologists scalpels, tweezers, forceps, metallic soap, entomological pins and containers of various sorts; and those for the botanists plant-presses; and papers of various sorts. While no list has been seen of supplies provided for the geologists and mineralogists, it is to be presumed that among them were hammers as well as magnifying lenses for the examination of specimens.

In respect of printed and other material, not only were there copies of charts of coastlines prepared by earlier chartmakers, but a comprehensive collection of the writings of the marine explorers, especially those of the Australasian region and Pacific. There was also a fine collection of texts relating to natural history, both in the way of general faunas and floras and those of particular regions, encyclopaedias dealing with the natural sciences, texts dealing with geology as well as with physics and chemistry.

It is worth noting also that there are detailed lists of drugs and surgical and other instruments for the use of the medical officers on the frigates in the archives of the Expedition.

### THE MANUSCRIPTS

Three manuscripts are known in which Péron described the natural history of Maria Island. These are located at the Muséum d'Histoire Naturelle at Le Havre (France), and are —

18041. Île Maria: observations de physique et d'histoire naturelle.

18042. Île Maria: suite des observations de physique et d'histoire naturelle.

18043. Histoire naturelle. Topographie générale de l'île Maria sur la côte orientale de la Terre de Diémen.

Each of the manuscripts is dated Ventôse an X, that is, February-March 1802. However, there is evidence that while the first two may well have been written at about that time, or at least before the *Géographe* reached Port Jackson in June 1802, the *Histoire naturelle* was written, or completed, after arrival there — the evidence for this lies in differences of comment between the two (see notes on zoology). The relationship between the various manuscripts in that the *Observations de physique et d'histoire naturelle* are drafts from which the *Histoire naturelle* was prepared. (Péron also wrote about the Aborigines of Maria Island, and a translation of that manuscript was published by Plomley in 1983.)

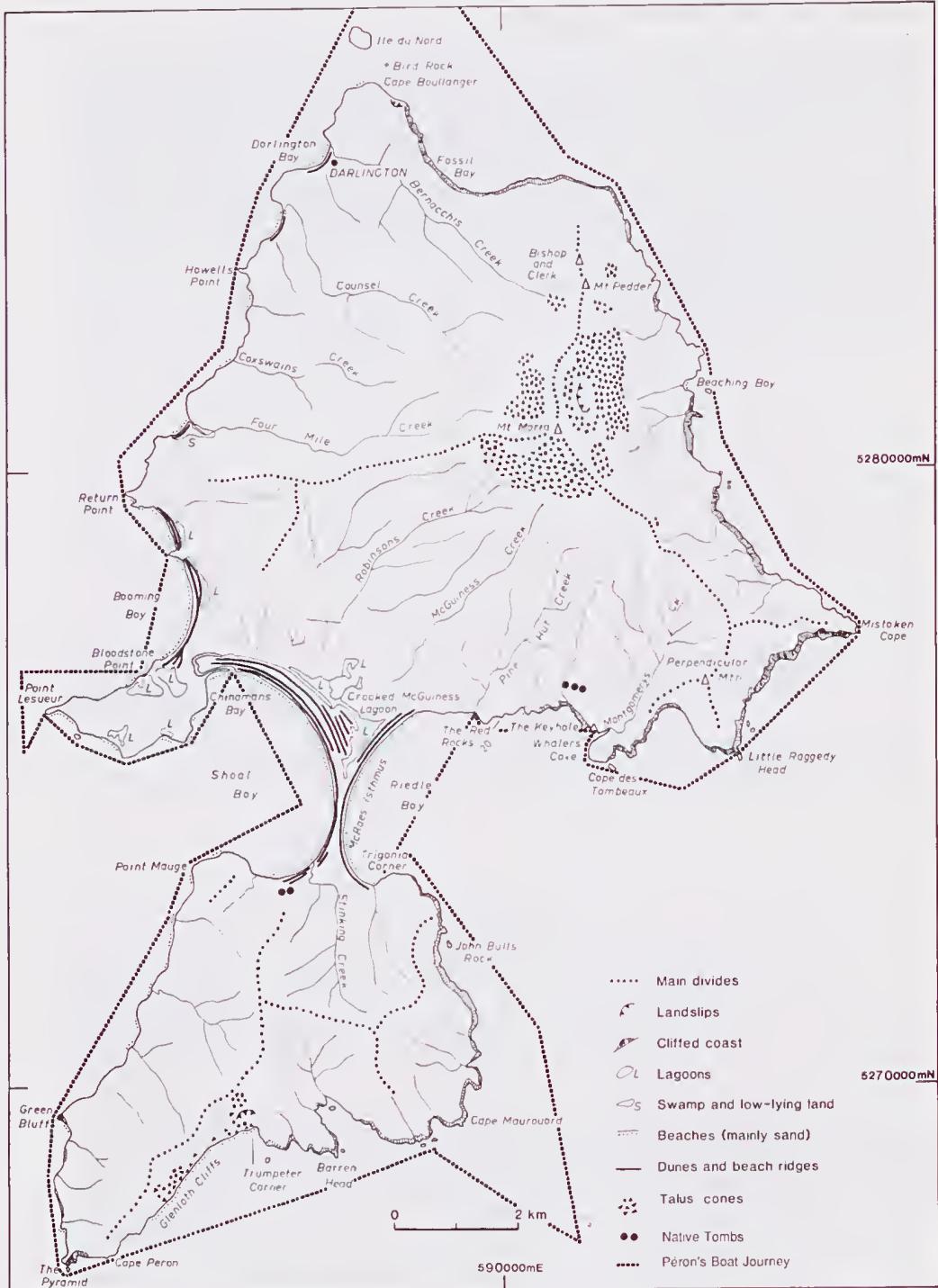
There are many comments in the manuscript dealing with differences between the natural history of Maria Island and that of D'Entrecasteaux Channel. Unfortunately, Péron's report on the natural history of the Channel, his topography and another entitled *Fasciculus Zoologicae*

*Hollandiae-novae* are also missing. These manuscripts are likely to have disappeared at the time Louis de Freycinet was publishing in 1824 the second edition of the *Voyage de déouvertes aux terres australes*.

The text translated here is the definitive *Histoire naturelle* (18043), but in writing the notes on that text account is taken of the two draft *Observations de phisique et d'histoire naturelle* (18041, 18042). While the latter contain the same substance as the *Histoire naturelle*, there are a number of differences between them, and this is particularly so in the more philosophical remarks on the geology. The *Histoire naturelle* begins with physical and meteorological observations on Maria Island, followed by the mineralogy, geology, botany and zoology. The arrangement in the drafts is somewhat different —

18041: mineralogy and geology, botany, zoology (part).

18042: zoology (conclusion), physical and meteorological observations, mineralogy (supplement), botany (supplement).



MAP 1

## THE TOPOGRAPHY OF MARIA ISLAND

Maria Island, elongated NNE almost parallel to the trend of the adjacent Tasmanian coastline, is separated from that coastline by the Mercury Passage, only 4 km wide at its narrowest point. The island is close to 20 km long and 13 km wide with a coastline close to 80 km in length of which almost 80 per cent is rocky and clifffed.

Mount Maria, the highest point, has a height of 709 m and is situated only 2 km from the east coast (see fig. 1). The highest point in the southern part of the island is Middle Hill (about 330 m high) just over  $\frac{1}{2}$  km from the eastern coast. The island consists of two elevated parts, the northern being the larger, connected by a sandy isthmus only a few metres above sea-level. The northern part itself is bipartite with Long Point leading out to Point Lesueur reaching only 28 m above sea-level but separated from the rest of the northern part by a neck of about 0.65 km wide and much less than 20 m a.s.l.

The rugged nature of the island and the rock types present as well as the recent geological history have combined to keep soil thickness small. Only in the floors of some of the larger stream valleys (e.g. Counsel Creek, Coxswain Creek, Four Mile Creek) and north and south of the isthmus are soils more than a few tens of centimetres thick. The soils are yellow podzolic soils on the granitic rocks and the Permian and Triassic sedimentary rocks, grey-brown podzolic on the dolerite (Nicolls & Dimmock 1965: map and pp. 28-29).

Mass movement landforms are present, although not common, and are very predominantly associated with the dolerite. Just east of Cape Boullanger and close to the place where the major meridional fault cuts the coast marine undercutting has produced a small slip in weathered dolerite. Large landslips occur at the junction of the coast with the southern end of the meridional fault (Clarke & Baillie 1984:23). Blockstreams with some landslips in them occur on the dolerite along the south-east-facing Glenloth Cliffs. Block glacis and some blockstreams flank the dolerite on the Mt Maria-Mt Pedder ridge (Clarke & Baillie 1984:24).

Little is known of the flow and composition of groundwaters. Springs are rare. M.J. Clarke, who mapped the island for the Geological Survey of Tasmania, recalls only one or two swampy areas on ridges in the uppermost mudstones of the Permian, probably just above a thin bed of quartz conglomerate (*pers. comm.*). Péron noted calcareous deposits on the surface of rocks along the east coast where water which had seeped through Permian limestones emerged at the surface. Groundwater passing through Triassic sandstones on the west coast (at and near Painted Cliffs) has contained or does contain iron in solution, precipitated in the sandstone as spectacular reddish iron bands, diffusion or permeation rings ("Liesegang rings").

The stream pattern on Maria Island is dominated by the difference between streams flowing east to the Tasman Sea, short with steep gradients, and those flowing to Mercury Passage, longer and lower gradient. The watershed is much closer to the east coast than to the west. The watershed on the northern part of the island has an S-shape in plan (Map 1), elongated north-south, that on the southern part an H-shape. In general, the streams flow away from the divides almost at right angles to the watershed but locally reaches may be controlled by the meridional faults and by-jointing in the granites, the Permian sedimentary rocks and the dolerite. The stream pattern north-east of Chinamans Bay is well expressed in the name "Crooked McGuiness Lagoon" where marine and aeolian deposition has led to engraftment of several streams and the ponding of water by beach ridges to produce the Lagoon. Most of the streams on the island have valleys with steep sides and no valley floors. However, Bernacchis Creek, Counsel Creek, Coxswain Creek and Four Mile Creek have all developed some valley flats in the Permian sedimentary rocks immediately upstream of the dolerite dropped down by the main meridional fault. These valley flats reflect the greater resistance to stream erosion of the dolerite as compared with the Permian rocks. They are also, in the Permian rocks, too large for the volume of water now flowing in them. The greater width of the valley floors upstream from the dolerite is not, as suggested by Everard (1957) the result of impoundment due to recent faulting. In a few places waterfalls are developed in the headwaters of streams flowing west or south-west from the Mt Pedder-Mt Maria divide where the streams cross a resistant sandstone near the top of the Permian succession (Clarke & Baillie 1984:8). Waterfalls also occur in several streams flowing east from this divide, where the streams cross a resistant stratum in the Permian rocks. Many of the streams flowing to Mercury Passage also are too large for the volume of water now

flowing in them, the valleys resulting from larger flows during the glacial stages of the Pleistocene (Davies 1965).

As with the streams, so also with the effects of the sea — there is a distinct asymmetry. The eastern coast, facing the storm waves of the Tasman Sea, is cliffted and irregular; the west coast has lower cliffs and many more beaches. Further, the offshore slopes are quite different. Slopes off the eastern coast are of the order of 1 in 20, the 50 m isobath lying only about 1 km off the eastern coast north of Mistaken Cape. The slope to the SSW off McRaes Isthmus is only 10 m in 7 km (1:700). Low submarine slopes flank the western coast from Green Bluff to Return Point but both south and north of these points depths in Mercury Passage do not reach more than 24 m in the south and 35 m in the north. During glacial maxima in the Pleistocene (possibly within the last 75,000 years, even as late as about 20,000 years ago), Maria Island was part of mainland Tasmania. Much of the east coast is granite or dolerite and the steep joints in these rocks allow the formation of cliffs up to 100 m or so in height. The Permian rocks, also with steep joints but less resistant to abrasion than granite and dolerite have developed cliffs, up to 160 m high on Fossil Bay, but with shore platforms at their base, a feature seen in the shorelines in the igneous rocks in only a few sheltered places. On the northern and southern shores of Riedle Bay, modern marine erosion has worked back to cliffs and a rock platform developed by marine erosion in the Early Permian (close to the Keyhole and south-east of John Bulls Rock). Marine deposits occur sparsely along the eastern coast and where present are predominantly cobbles and boulders of local rocks in very restricted pocket beaches. Small offshore islands and rock stacks are common along the eastern coast and attention could perhaps be drawn to the Boy in the Boat and The Pyramid at the southern end and Bird Rock and Ile de Nord at the northern end of the island. A small arch, the Keyhole, was developed in granite at a slightly higher sea-level than the present. The western coast has lower cliffs, some cobble beaches and a number of sandy beaches. The lower cliffs are probably a function of two factors — one is the short fetch across Mercury Passage leading to lower wave energy, the other is that the dolerite is probably close to the top of a sheet intruded into Triassic sandstone (see earlier), a sheet from which the overlying rock has been stripped by Pleistocene marine erosion at higher sea-level and by later sub-aerial erosion. Many of the sandy beaches on this coast are close to coastal outcrops of Triassic sandstone or at the mouths of streams draining Triassic sandstone or the Permian succession which includes sandy units. The origin of the much greater volume of sand on and close to the isthmus and north-east of Shoal Bay is more difficult to envisage. Some of it may have been derived by marine erosion from the granitic rocks of the eastern coast but most would seem to be westerly derivation, possibly from more extensive areas of Triassic sandstone than now exposed but which were exposed at lower sea-level during glacial stages in the Pleistocene. All of the major sandy beaches on the western coast have streams cutting through their northern end or near thereto, suggesting a northerly sand movement along the western coast and a northerly current set or a predominant north-easterly swell. Such a predominant swell would also be consistent with the much greater development of sandy deposits to the north-east of Shoal Bay. Lagoons occur behind a number of beaches. Old marine sands and raised beach deposits up to about 20 m above sea-level on the western side of Maria Island (Clarke & Baillie 1984:24) may be correlated with a Last Interglacial high sea-level (Van de Geer *et al.* 1979; Bowden & Colhoun 1984).

A major feature of marine deposition and associated aeolian activity is the sandy tombolo, McRaes Isthmus. This feature, like others on Maria Island, shows an east-west asymmetry. Deposition of sand has been greater around the shores of Shoal Bay than around the shores of Riedle Bay. There are at least seven beach ridges north-east of Shoal Bay (Clarke & Baillie 1981), only two behind the northern shore of Riedle Bay; two behind the south-eastern shore of Shoal Bay, only one behind the southern shore of Riedle Bay. The isthmus is prograding to the west more rapidly than to the east. As noted by Clarke & Baillie (1984:24) the isthmus has developed within the last 6,000 years. Dunes have developed behind beaches on the western coast and on the isthmus due to wind activity but are nowhere high nor numerous. In several places sheets of aeolian sand may have developed in the later part of the Last Glacial Stage (Clarke & Baillie 1984:24).

Periglacial activity, as represented by talus cones, has been active on Maria Island, as low as about 200 m a.s.l. at Glenloth Cliffs. It is noticeable that the effects have been greatest, and

operated at a lower altitude, on the eastern side of the main divides, an asymmetry consistent with the aspect.

In a few places, e.g. near Mistaken Cape and near Cape Mauroard, the granitic rocks have developed characteristic rounded bare knolls and tors. The Triassic sandstone on the higher parts of the Mt Pedder-Mt Maria ridge shows a characteristic scarp backed by a flat-lying platform of variable width and the Jurassic dolerite shows cliffs with steep joints, backing talus slopes and not uncommonly capped by isolated columns or groups of columns.

The intense attack by waves from the Tasman Sea, the varying rock types, their internal structures and mutual relationships together with relatively recent uplift have controlled the topography of Maria Island. The topography and geology have in turn controlled the ecology of the island and the immediately surrounding waters and the distribution of Man's activities on the island.

#### BRIEF NOTES ON THE CLIMATE

Lack of a fully equipped weather station on Maria Island limits the comments that can be made on the climate.

The nearest station which records temperature is at Orford, on the Tasmanian coast. The temperature data for the years 1968-1987 are summarised as Table 1. It will be seen that over this period the temperature did not exceed 24.5°C nor fall below 0.6°C. Average maximum daily temperatures have ranged from 13.3°C to 22.3°C, average minima from 2.9°C to 11.7°C. Because it is an island, Maria Island probably has a lower range of temperatures than those at Orford but a similar mean.

Rainfall has been recorded at two stations on the island, one at Darlington (74 years), one at Chinamans Bay (13 years). The average annual totals are close, 669 mm (Darlington) and 626 mm (Chinamans) (Table 2) but the rainfalls are quite variable in any month from year to year. Thus the February rainfall at Darlington has varied from 1 to 249 mm, the May rainfall from 1 to 293 mm. Midsummer rainfall (January) has varied from 4 to 162 mm, midwinter (July) from 8 to 211 mm. Scott (1956: fig. 1, p.50) plotted the relative variability of annual rainfall of the northern part of the island as equal to or more than 20% of the southern part as between 18 and 20%

Regrettably no wind velocity and direction figures are available for Maria Island. The nearest recording station is at Orford, protected to some extent from easterly and south-easterly winds by Maria Island and to some extent from north-easterlies by hills east and south-east of Triabunna. Although further away, records from Tasman Island are probably more relevant. The incidence of winds stronger than 30 km/hour at Orford and Tasman Peninsula is tabulated (Table 3). The strongest winds at Orford come from the north-west and the south-west, with north-east and south-east as minor sources. At Tasman Island the highest incidence of very strong winds is from the south-west, and such winds may be expected to be significant at Maria Island, especially on the southern half. Other strong winds at Tasman Island come from the west, not likely because of the shorter fetch to be so significant in driving wave action on Maria Island, and from the north, a direction which would be significant in terms of intensity of wave action on Maria Island. Southerlies are of some significance but strong winds with an easterly component are relatively infrequent.

Davies (1965:21) included Maria Island in the subhumid process province characterised by low effective precipitation, variable stream flow and groundwater level and non-perennial and underfit streams.

#### PLACE NAMES

Place names mentioned in the text are identified as they occur, but it should be noted that

the name Oyster Bay has been applied by Pérön to that part of the modern Oyster Bay on the western side of the neck connecting the northern and southern parts of Maria Island, a part which is now called Shoal Bay. The *Géographe* and *Naturaliste* were anchored offshore in this bay, to the westward of Point Mauge. Pérön's Oyster Bay is at most the southern part of the whole bay between Maria Island and the mainland, with its entrance southwards. The northern part of the modern Oyster Bay was known to Baudin's people as Fleurieu Bay. The bay to the eastward of the Neck was known to the Frenchmen as the Eastern Bay, and is now known as Riedle Bay. The Great Oyster Bay of modern maps is that part northwards of the southern extremity of Schouten Island.

#### MANUSCRIPT 18043: A TRANSLATION

Natural History of Maria Island by François Pérön

General topography of Maria Island, off the east coast of Van Diemen's Land.

Ventôse, year 10 [February-March 1802]

Note: The inhabitants of Maria Island not only belong to the same nation as those of Van Diemen's Land, they also pass between the two islands and live alternately on both of them. Theirs must, therefore, be a common history, and its interest obliges me to put it off until another time.

*First Section:* Physical and meteorological observations.

Position:

1. Maria Island, situated off the east coast of Van Diemen's Land — not far from Cape Frederick Hendrick, lies in 42°42' of south latitude and is 145°50' east of the Paris meridian.

Discovery:

2. It was discovered in 1642 by Abel Tasman.

Shape:

3. Its shape is very irregular. Broader in the north, it is also very broad in the south, while its central section is very narrow from west to east. The land here is no more than a small isthmus, 250 to 300 paces across, completely sandy and extremely low-lying.

Consequences of this shape.

4. As a consequence of this general and particular disposition, Maria Island, while protected on the west side by the high mountains of Van Diemen's Land, is (by contrast) entirely exposed on the east to the fury of the winds and waves of the vast Southern Ocean.

5. To the north and, particularly, the north-west, Schouten Peninsula protects it from the winds that blow from these two directions, while to the south and particularly, the south-east, it is partly sheltered by the coast of Van Diemen's Land, which juts out as far as the line of longitude that runs through the middle of it.

These general notions will supply us with frequent applications throughout the remainder of this dissertation. At present we must draw from them [ideas] as to what we are going to say of the winds, the temperature of the earth and its moisture.

Winds.

6. The island's position must make them rather variable; it must also make them rather violent. With regard to the prevailing winds, our stay in these regions was too short for us to acquire the knowledge which must result from a long series of experiments and observations. I must confine myself to a few general thoughts on the particular action of each wind, considered in relation to the general constitution of the island and the neighbouring lands.

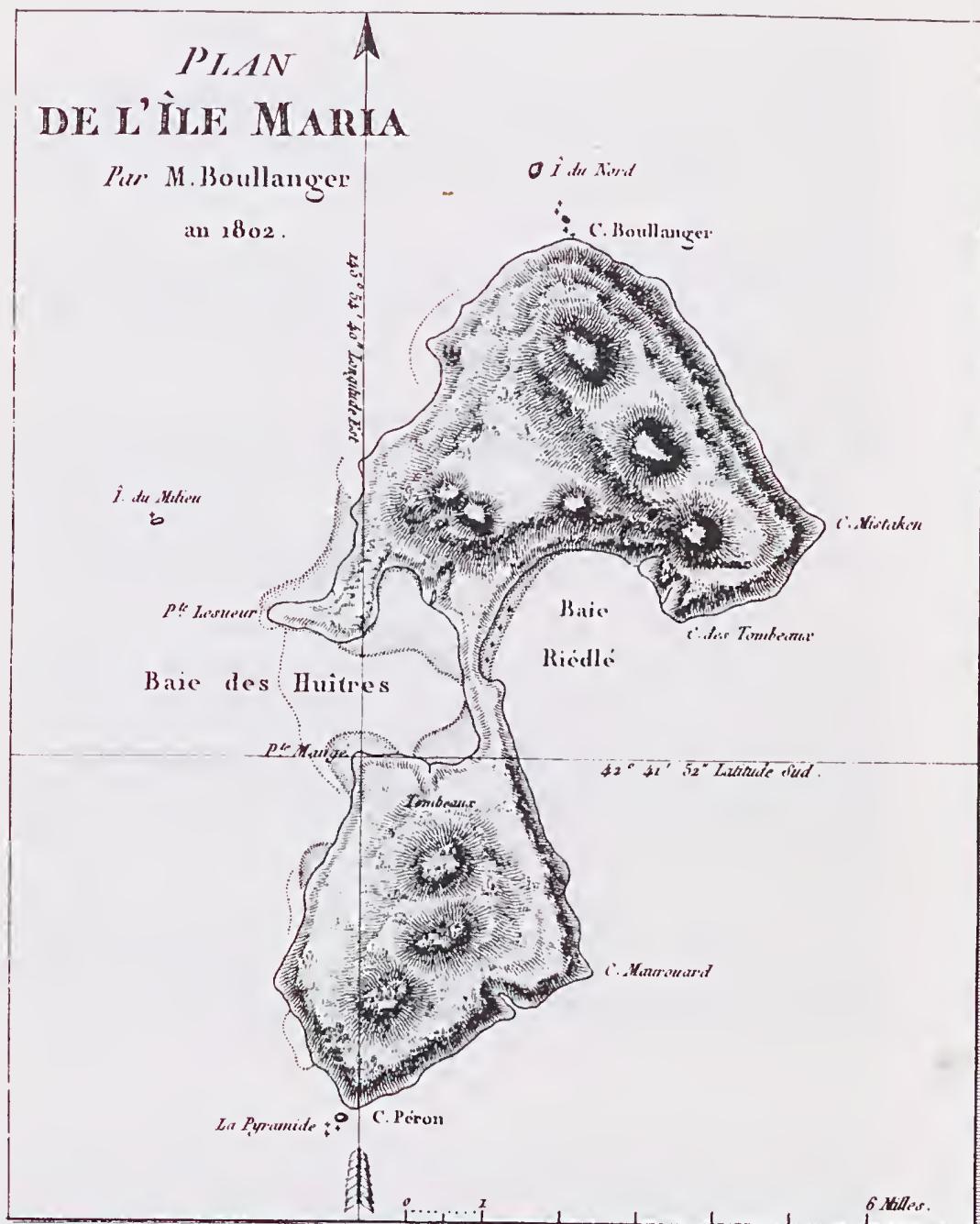
From the east:

7. First, winds from the east: they must be the most violent; and the nature of this part of the coast of Maria Island (35, 34), as well as the sparseness of the vegetation all along the side of the

*PLAN*  
DE L'ÎLE MARIA

Par M. Boullanger

an 1802.



MAP 2

moutains exposed to them (67), sufficiently proves this first conclusion for it to be unnecessary to dwell on it at greater length.

From the west:

8. Secondly, winds from the west: checked by the mighty peaks of the mountains of Van Diemen's Land, these have almost no effect upon the little island under discussion. It is also on this side that the most extensive and numerous alluvial deposits actually occur (49). One must also attribute to this geographical disposition the even, sandy appearance of the whole coast on this same westerly side.

From the south:

9. Thirdly, winds from the south: moderated by the disposition of the southernmost part of Van Diemen's Lasnd, these must be less violent than they would actually otherwise be. Nevertheless, since they blow from lands near the Pole, Maria Island cannot entirely escape their influence. The ruggedness of the south-west coast, exactly like that of Cape Pillar and Cape Basalt, is fairly obvious proof of the violence of the stormy winds from this quarter.

From the north:

10. Fourthly, winds from the north: Schouten Peninsula does much to shelter Maria Island from these last winds, but as the terrain of Van Diemen's Land is lower towards this point than it is around Cape Frederick [Hendrik] and Cape des Sarcelles, they must have some influence. However, since they blow from more temperate regions, they are far from being harmful and actually appear favourable to the vegetation — at least it is most flourishing in this area. It is here that the coast looks most cheerful and pleasant — especially to the north-north-east, whereas to the south-south-east it is wilder and more barren and is beset with many rocks and reefs (34).

Temperature:

11. Temperature: the situation of the island under discussion below a fairly high parallel in the southern hemisphere (1); its exposure to winds from the south (4, 9) and more particularly to those from the south-south-east (10); the smallness of the island; the height of the coast on the east side (34), as well as that to the east-north-east (130); the proximity of the still higher terrain of Van Diemen's Land (4); the lie of the island, so narrow in the middle (3) that its interior is almost completely taken up by water; finally, the rather extensive marshes in the north — all these are so many circumstances calculated to reduce the heat of this island. And indeed, although we were there in the middle of the hottest season, the mean temperature that we experienced during the ten days of our anchorage at the entrance to Oyster Bay did not exceed 15°, and the mean was 12°.

At night:

12. The nights, in particular, were extremely cool, and during the three days that we spent examining this island (my friend Boullanger, Mauroard and I), the thermometer did not rise, around five o'clock in the morning, beyond 8° to 9°. Towards midday, however, the heat on shore was fairly intense — a circumstance that seemed to me to be partly dependent upon the glare produced by the whiteness of a completely sandy and very long beach.

Humidity:

13. Humidity — The same factors that we have just successively pointed out as being capable of lowering the temperature (11) combine likewise (for the most part, at least) to make the atmosphere more humid. And so, mists seem very plentiful there, with the moutain tops lost in them each night and morning.

Of the earth:

14. The earth shares these characteristics of the atmosphere. It is generally moist wherever the sand and rocks are not too exposed and is even marshy in some places (19, 63).

Fresh water:

15. Fresh water: from these two observations (13, 14), one could perhaps draw the conclusion

that there is an abundance of fresh water on this island. However, this is far from being the case; and if one reflects for a moment upon what we have already said about its general conformation, one must easily conceive of this scarcity of fresh water.

Physical causes of its scarcity: Indeed, in addition to the smallness of the island (11) — which, of all the circumstances capable of reducing the amount of it, is incontestably one of the most important, its particular shape (3, 11) constitutes a fresh obstacle to the formation of streams and especially their lengthening. The nature of the eastern coast — sheer and precipitous for its full extent — likewise militates against the existence of any stream of any great size. Everywhere on this side there are steep, unbroken walls (34). There are no mountains on the west coast. The terrain is low-lying and sandy (49) and consequently little suited also to the formation of streams. The same does not apply to the north-east or south-west sections, the former corresponding to the northern side of the eastern bay [Riedle Bay] and the latter to the southern side of Oyster Bay [Shoal Bay].

Places favourable to its existence. Both have higher mountains with thicker forests on their slopes and denser vegetation; both are broken by more decided valleys; lastly, both are made up entirely of granitic rocks reaching right down to the shore. It is there, therefore, that one must go looking for fresh water; it is there that it is in fact to be found — more abundant in the eastern bay, where the mountains are higher, and (on the contrary) scarcer in Oyster Bay, where the peaks are lower and the soil is also sandier (8).

#### Streams in the eastern bay:

16. Streams in the eastern bay: there are two of them, both on the north side of the bay. The first is at the foot of Cape des Tombeaux. It is the bigger one, its water is fresher and of better quality. It runs freely enough (even in the season that we were there, which must be the driest) for one to be able to collect rather a large quantity of it. But since this operation would necessitate anchoring at the mouth of the bay — which would be highly dangerous (35, 58, 59), this supply would only be of use in an urgent and absolute shortage of fresh water. In this situation it would be particularly precious, as there seems to be no other along the entire east coast of Van Diemen's Land. This coast even appears to be completely unapproachable.

The second stream in the eastern bay is closer to the entrance to the bay, at the head of a small cove that is very safe for a boat. The stream runs down a rather deep gully and this helps to conceal it; it is still further concealed by the way in which it ends. In fact it disappears in the sand fifty or sixty paces above the head of the small cove that I spoke of, so that one must go some distance from the shore in order to come upon it. However, watering there is easy, for in the granite that forms its bed, one finds small cavities deep enough to receive a whole water-cask. For the rest, since its course is obstructed by the debris of plants, its water is a little less pure than that of Cape des Tombeaux.

#### Streams in Oyster Bay:

17. Streams in Oyster Bay: strictly speaking, there is only one, and even that is very small. It is on the south side of this bay, a little further west, however, than the point which forms its entrance. It is difficult to find because of the slight amount of water that runs from it and even more because of the depth of its bed. It is a kind of little torrent, cut off by plant and grass debris which gives it a rather bad taste. Furthermore, it cannot be of any use because of the small quantity that one would be able to obtain from it.

18. On the north side of this same Oyster Bay, towards the marshes of which I have often spoken, nature has been able once more to contrive some expedient for supplying drinking-water to the inhabitants of this land. By digging down in the very moist soil of the swamp, they have created a sort of shallow well, into which oozes a small amount of stale, sweetish water. This, because it is stagnant, had acquired a rotten, marshy taste that is very unpleasant. Despite this drawback, the natives do not scorn this water. Not only can one see a great number of footprints around its edge, but they have also placed about it some large pieces of bark, upon which they appear to have sat. Finally two or three shells of *Haliotis gigantea* seem to have served them as drinking-vessels.

#### Rainbow and paraselene ("mock-moon"):

19. After what I have said (13, 14) of the abundance of vapour around Maria Island, one must

not be surprised by my having had occasion several times to observe a rainbow and a paraselene. These were, moreover, the only meteorological phenomena that I was able to detect.

Barometer:

20. Barometer: from what I have said of the almost constant state of mist (21) and of the dampness of the atmosphere (13) and the earth (14), it is easy to imagine that the barometer did not rise greatly. Indeed, the readings of this instrument, taken over the ten days of our anchorage in Oyster Bay, barely produced an average of 28.1.6 — undoubtedly a low average for the latitude (1) in which we observed it.

21. I include here the general table of meteorological observations made on board our ship during our anchorage in Oyster Bay. The observations are six-hourly, starting from six o'clock in the evening.

**GENERAL TABLE OF METEOROLOGICAL OBSERVATIONS, MADE ABOARD THE  
GÉOGRAPHE DURING OUR ANCHORAGE AT THE ENTRANCE TO OYSTER BAY  
ON MARIA ISLAND IN VENTOSE, YEAR 10 [1802]**

Days of the month	Winds	Barometer	Thermometer	General Atmospheric Conditions
29 Pluviôse [18 February]	SE, SSE NE(?) NNE NNE, NE(?) NNE, NE(?)	28 3.8" 28 3.4" 28 2.5" 28 1.0"	13 0° 12.8° 14 0° 15.0°	During these twenty-four hours, the weather was generally fine, but humid in the daytime. The night was misty. The winds very slight.
30 Pluviôse [19 February]	NNE, N, NNW NNW, N, NNW SSE Calm	27 11 5" 27 11.0" 27 11.0" 27 10 5"	14 0° 13.3° 15.0° 14 3°	The weather fine but still very humid on account of the prevailing north-north-westerly winds, the consequence of which was to send the barometer down, while slightly raising the temperature.
1 Ventôse [20 February]	SE variable to NE Calm	27 11 0" 27 10.5" 27.11.5" 27.11.5"	15.2° 13.0° 14.0° 15.0°	Weather misty until eight o'clock in the morning; winds variable from SE to NE and squally until four in the morning; the rest of the day almost calm.
2 Ventôse [21 February]	ESE, E SE ESE var. to E ESE var. to E	28 1.5" 28 1.8" 28 2.0" 28 2.5"	14 0° 13.5° 12.0° 12.5°	The weather still very fine from noon until nine o'clock; at half past nine, the wind freshened, at ten o'clock at night there was a downpour; for the rest of the night the weather was squally and misty, with frequent rain.
3 Ventôse [22 February]	Winds variable from N to E	28 2.0" 28 1.5" 28.0 0" 27.11 0"	12.3° 11.6° 12.4° 13.6°	Misty weather, with frequent rain. The winds variable from N to E and very slight
4 Ventôse [23 February]	Variable N to NE	21 10.8" 27.10.5" 27.10.0" 27.9.5"	13.0° 12.8° 12.6° 12.0°	Weather overcast and very damp, excessively heavy mist all night; incessant rain; at seven o'clock the winds changed to S, the squalls grew very strong, we dragged our anchors
5 Ventôse [24 February]	Variable from S to SSW Variable from W to SSW	27.10.5" 28.1.0" 28.2.5" 28.3.5"	11.5° 10.8° 11.2° 12.0°	Until three in the afternoon, the winds variable from S to SSW and very fresh; squally weather; rain with the squalls; at 4 o'clock, the winds having moderated, the weather improved.
6 Ventôse [25 February]	Variable from NW to NE Weak	28.3.8" 28.3.9" 28.4.0" 28.3.5"	11.8° 11.8° 12.0° 13.5°	Very fine weather; winds variable from NW to NE and weak.
7 Ventôse [26 February]	N by NW S by SW Breeze from SSE	28.3.6" 28.3.5" 28.3.8" 28.4.0"	12.6° 12.5° 13.8° 14 0°	Fine weather; we set sail at nine o'clock in the morning, with a slight breeze from SSE.

*Second Section: Mineralogical Observations.*

Few mineral products:

22. The mineral products of Maria Island do not appear to be extremely varied. The generally granitic nature of the terrain and the smallness of the island are sufficient to explain this scarcity of minerals. Here is a list of those which I was able to collect myself on my various excursions and which are almost all one can obtain.

Green granite:

23. Firstly, medium-grained, dark green granite similar to that of Bruny Island and Van Diemen's Land: the rocks of the south and south-east corners of Maria Island are formed of it; one also finds it on the southern shore of Oyster Bay, near the mouth; it is to be found likewise towards the northern tip (of the island); the shingle on the south side of the eastern bay is entirely made up of it, and it reappears on the north side of the same bay, but only near its head. Finally, it appears to form the foundation of all the lowest rocks.

Superb granite:

24. Secondly, very coarse-grained granite with superb crystals of felspar: this magnificent granite — the most beautiful that we have encountered so far — occurs on the north side of the eastern bay, above Cape des Tombeaux: all the mass of rocks near the second stream (16) is formed of it, and all the lofty peaks of the north-east corner appear to be made of it as well. I have given a very fine specimen of it to my friend Depuch, and am keeping several others like it.

Primitive sandstone:

25. Thirdly, primitive sandstone, hard, compact, very sparkling, whitish, homogeneous: it forms very large masses; it blocks the little valleys that occur between granitic rocks and crops out on their sides; and a few reefs also appear to consist of it.

Secondary sandstone:

26. Fourthly, secondary sandstone, softer than the preceding one, less compact, friable, calcareous: it forms all the horizontal layers of which I shall shortly be speaking (37, 38); it undoubtedly has its origin in a succession of deposits slowly built up by the waves and then abandoned by them (38). It would be of equal interest and value to climb up to these layers, for they would undoubtedly yield precious information upon the geological upheavals of these lands.

Petrosilex:

27. Fifthly, among the shingle on Cape des Tombeaux, I found a few fragments of petrosilex. It was the only place where I could see any.

Muddy iron ore:

28. Sixthly, muddy iron ore, very friable and very red: it occurs in various places on the island, but most particularly on the northern side of the two bays. As it is a very deep red, powders easily and, moreover, is almost clayey in nature, I have reason to think that this is the substance with which the islanders paint their hair red and make those little tufts that look like so many curl papers.

Soil:

29. Seventhly, soil: generally shallow on the top and sides of the mountains, it lies deeper in the small valleys; in some of them, it is of the best quality — heavy and black, and when heated to a high degree it turns red — a sufficient indication of the presence of a fairly large proportion of iron oxide and (probably) of this muddy iron that I have just spoken of (28). In the marshy areas, which I have said are to be found near the northern side of Oyster Bay (14, 18), the soil is made up of the debris of accumulated land and marine plants and is peat-like in character, which fact is perfectly consistent with its origin. Finally, in the places closest to the shore, which are lower-lying and owe their formation to the receding of the sea, the soil is meagre. It is heath mould, shallow and very sandy. This character is particularly apparent all along that portion of the island's coast which begins near the north head of the entrance to Oyster Bay and runs from west to west-north-west.

Sand:

30. Eighthly, sand: the sand on the shore of the eastern bay is darker and contains more debris

of fucus and other seaweeds (54); that of Oyster Bay, mixed with more of the remnants of the shellfish that cover the bottom of this bay, is whiter, finer and contains a fairly large amount of calcareous matter.

No calcareous stones, etc:

31. Ninthly, calcareous and silicious stones and volcanic substances: nowhere could I find any sign of pure calcareous or silicious stones and nowhere could I discover any volcanic substances either.

### *Third Section: Geological Observations.*

General remarks:

32. The situation of Maria Island in a latitude so close to the farthest point of the South Lands (1), its singular shape (3) and the different composition of its various parts (8, 10) could not fail to arouse my interest; and, having been enabled to study it very closely and at every point by the voyage of reconnaissance that I made around this little island with our surveyor, my friend Boulanger, I have overlooked nothing in order to give my observations that generality and correctness which, until now, I have so rarely yet been able to give to anything that I have done. In the second section I spoke of all the mineral products that I was able to collect. I shall now dwell on some geological observations.

East coast: the south-south-east, south-east, east, east-north-east and north-north-east coasts.

33. General idea: everything here bears the mark of the world's upheavals, everything here attests to its great antiquity; everything recalls the painful struggle that it had to carry on against the fury of the waves; everything speaks of their ancient dominion over the land...the traces of their gradual recession are to be seen everywhere and in the shape and distribution of the rocks, as well as their nature.

Ramparts of granite:

34. There, ramparts of granite seem to present an insurmountable barrier to the ocean. Steep and sheer, they rise wall-like to a height of two or three hundred feet. In their sides there are sometimes more or less large caves, in which the waters, as they surge tumultuously in, produce dull boomings like the sound of distant thunder.

Reefs:

35. Here, rocks at water level reach out from the coast. They form redoubtable lines of reefs in the open sea, which can only add to the feeling of horror that the appearance of this inhospitable coast inspires.

Horizontal layers:

36. At several points along this same coast and at the top of these granite ramparts (of which I have just spoken (34)), one can observe regular horizontal layers of a dull white colour. In a few pieces of them, I found a kind of calcareous sandstone that was manifestly Tertiary in origin, in comparison with the granites themselves (26).

Their disposition:

37. These horizontal layers on top of primitive rocks extend in regular fashion along a whole section of the coast. They are always at the same height and always have the same features, despite the interruption of patches of earth produced by rocks being torn from the ground and falling, and despite the existence of fairly deep valleys between the mountains. This disposition is particularly striking near the two points that form the mouth of the eastern bay. Broken by the opening of the bay itself, the layers continue at the same height on both points.

38. It seems to me that what I have just said here about the nature (36) and disposition (37) of these horizontal layers can leave no doubt at all as to their origin. Evidently created by a series of accumulated deposits, they were formerly submerged beneath the waves and have only been

exposed as a consequence of that gradual and continued recession of the seas, the obvious signs of which we have found everywhere — both on the arid beaches of the west and north-west of New Holland and on the lofty, fertile rocks of Timor. This is not the moment to embark upon a dissertation on the causes of this recession of the seas. It is sufficient for us to admit its occurrence for the explanation of all the geological phenomena that I was able successively to observe in the formation of Maria Island.

The island was formerly submerged:

39. In an undoubtedly very far-off era, lost in the mists of time, all the highest peaks of this island were still hidden away at the bottom of the ocean. Everything was covered by the waves (38). Over the centuries the mass of water diminished, and (this diminution being too gradual for us to perceive, but not passing unnoticed by Nature) the ground must have risen imperceptibly towards the surface of the sea.

First peaks:

40. By and by, the first peaks appeared. Coming forth from Nature's flank in the earliest days of the world, they were necessarily formed of primitive rock; and indeed all of them are a very beautiful granite (23, 24).

Their features:

41. At first there were only a few rocks at water level. They must, therefore, have formed as many shelves and reefs, upon which, as they broke, the stormy waves must have left deep imprints of their action and efforts. Indeed, all the summits of the steepest mountains — not only on Maria Island, but on Cape Pillar and Cape Frederick Hendrick, as well — exhibit those tattered and (so to speak) dissected shapes which reefs and rocky shelves always assume and which are obviously to be found at several points along the coast of the [island] under discussion. They occur even more strikingly on that island that my friend Boulanger thought it his duty to name The Pyramid because of its terraced, dissected appearance, in the style of those Chinese towers which bristle with points and unevennesses.

Rocks and reefs of the NNE coast:

42. Such again is that other rock which lies off the north-north-east coast of the island presently under discussion, between the small islet and the land — a rock from each of whose sides long reefs run out to join both Maria Island in one direction and the small islet opposite [in the other]. But let us return to the new effects that must be created by the continued recession of the ocean, for the laws of nature are as mighty and general as they are uniform and constant.

Formation of the first valleys:

43. Our peaks (41), scarce and solitary at first, multiply imperceptibly. They grow bigger at their base and become joined together. The chains of reefs begin; they stretch out at the water's surface, they grow longer still, they curve and break off, and the first elements of valleys start to be definable above the sea.

44. Some of these developing valleys, almost completely concealed beneath the water by the very disposition of the rocks and reefs surrounding them, can and actually do find themselves protected more effectively from the action of the waves. Calmer below the surface, these gradually deposit there all the accumulated debris from the nearby rocks which they have destroyed or eaten away. It is then that the first deposits begin; it is then that the formation takes place of those masses of secondary rock which I have mentioned as occurring at several points along the coast and as always lying on top of the primitive rock (25).

Progression of geological phenomena:

45. Thus far we have seen no other agents, in the midst of so many upheavals, than the waves themselves and the primitive rocks entirely hidden away in their depths. New influences are going to introduce new modifications, and the history of the earth will be more and more complicated by the diversity of their products. We have seen our granite peaks, isolated at first (40), gradually become joined to one another, form chains of reefs (41, 42), extend their ramifications (43) and give birth to deep valleys protected from the fury of storms (44); and we have seen the formation in these underwater valleys of the first deposits and the first secondary rocks. It is to the following period that we must ascribe the origin of the first shellfish and also that of the first marine plants.

Marine plants and shellfish:

46. Indeed, the profound calm of these first underwater valleys, the quality of the softer soil — everything was favourable to Nature's plans. She developed there the potent germ of life and multiplication. From that moment on, the uniformity of the deposits disappeared with their homogeneity. Mixed with the remains of shellfish (115-120), the debris of the primary rocks was thereby successively modified in twenty different ways. According to whether the calcareous particles were either more plentiful or more rare, the sediment acquired a particular character; and since, in the same period, it became further degraded by remnants of fucus and other marine plants (45, 51, 130), a notable change in its essential composition was bound to follow.

Heterogeneous and Tertiary deposits:

47. From these various mixtures, there soon arose a more important phenomenon, namely that of deposits in horizontal layers which followed upon those in deep masses. This sequence in the nature and arrangement of the deposits, conforming perfectly to theoretical principles, conforms no less to the general constitution of the seabed under discussion. Indeed, these Tertiary layers (26) are to be seen everywhere, lying on top of the secondary layers (25) which, we have said, rest in turn upon the granite (23, 24, 44).

North-west, west and south-west coasts:

48. I have just concluded the account of the east coast of Maria Island; it was too curious not to detain us for a few moments. The west coast, more recently formed, will offer us phenomena of a different kind, but possibly no less important to recognise and analyse. Sheltered by the mountains of Van Diemen's Land (8), this coast not only found itself protected by them from the action of the waves, but also must have been enlarged by their debris. It was indeed increased by it.

Alluvial deposits:

49. Held in by the mountains of the east coast (34), these fragments of Van Diemen's Land accumulated at the foot of them, filled the depths of the ocean, rose up above its surface and gradually spread. Two higher groups of mountains left a space between themselves, the fragments invaded it, and the isthmus separating the eastern bay from Oyster Bay must have been formed. It joined together originally separate pieces of land, Maria Island was enlarged, and as a consequence of this invariability of Nature's laws — of which we have already spoken (42) — the limits of its growth have not yet been reached by a long way.

The blocking of Oyster Bay:

50. To be convinced of this, one need only observe how favourable the floor of Oyster Bay (as a consequence of the latter's disposition) is to the building up of alluvial deposits. Although the bay is very large, it is everywhere so shallow, that it is impossible (even with a light boat) to come closer in to its shore than 15 to 20 fathoms. The entire bottom is formed of very white, very fine sand (30), spread uniformly all over it. Carried along by the stormy seas that break against the neighbouring coast of Van Diemen's Land, the sand is gradually deposited by them near the head of the bay, which is calmer and more sheltered from the fury of the winds.

51. Apart from the physical occurrences which tend to fill up Oyster Bay, there is another, possibly no less powerful factor that must not be neglected here. I mean those vast banks of oysters (120) and large shellfish (115) which cover its floor, fill it up with their accumulated debris and contribute no less effectively, perhaps, to the alluvial deposits of these shores than the numerous zoophytes whose prodigious operations in the equatorial seas we have all admiringly acknowledged.

Alluvial deposits in the eastern bay:

52. Whereas Oyster Bay thus tends from day to day to be filled up by a more peaceful, uniform and gradual deposit, the eastern bay, by completely different means, cannot avoid experiencing a similar fate; and it is even possible that the progress of its growth is actually more rapid. As a matter of fact, although it seems at first sight that the exposure of this bay to the rough winds off stormy sea (7) must have been a powerful obstacle to its filling up, one nevertheless soon observes (upon analysing their effect) that this last circumstance, far from interfering with or preventing it, is one of the factors most favourable to it. Indeed, it is in vain that the tumultuous waves surge violently into the mouth of the bay; it is in vain that their fury makes itself felt right

down into its depths — it is impossible for them to destroy its floor or, at least, to carry the rubble away from it. The currents (58) and the very direction of the winds, combined with the depth of the bay, form as many obstacles to this removal of the bottom's debris. It is in vain that the sand on the shore is vigorously stirred up by each wave that breaks upon the beach; it falls back with the wave on the very spot from which it was taken in the first place. The actual amount of land in existence cannot, therefore, be reduced; on the contrary, it must be increased by everything which the currents (58) and the waves themselves can carry and which must remain there for the reasons that I have already given here.

53. Nevertheless, it must be agreed that these ways of building up alluvial deposits in the eastern bay would not be comparable with those in Oyster Bay, had Nature not kept a last one for herself, upon which I must dwell more particularly here. I do not mean shellfish; they appear to exist only on one section of the northern shore of the eastern bay. But if they are rarer there than in Oyster Bay, they are advantageously replaced by an enormous quantity of colossal fucus (126 *et seq.*) which, at several points along the coast, entirely blocks the way (130) and whose debris, washed back towards the head of the bay, must gradually raise both its floor and its shores.

Physical cause of the abundance of fucus in the eastern bay.

54. The abundance of this fucus, not only in the eastern bay, but also along the greater part of the coast on this same eastern side, obviously depends on the different nature of the bottom. This more generally consists of granitic rocks, upon which these plants grow more easily and for preference. As they detach themselves from the bottom or, rather, are pulled away from it, they join together in great clumps, which are soon carried towards the head of the bay under discussion and are washed up on its shores, there to be shortly buried in the sand thrown up by the waves.

Bar on the bottom of the eastern bay.

55. This frightful bar on the bottom of the eastern bay, over which the waves break furiously, is possibly formed of nothing more than these masses of fucus, held in place by the sand under which they are buried.

This presumption is made all the more likely by the total absence of any rock capable of creating the bar. It is still confirmed by a close examination of the composition of the isthmus separating the two bays (48).

Isthmus:

56. Indeed, when one studies the formation of this isthmus, one readily recognises that it owes its origin to the accumulation of sand at this point. But it is also noticeable that this accumulation is not uniform and regular on the side of the eastern bay, as it seems to be along the shore of Oyster Bay. And although this spit of land is no more than 250 to 300 feet wide, one can easily make out several rises — not very great, it is true, but still all plainly perceptible — which run in a line parallel to the shore of the eastern bay, gently curving in the same direction.

Consequence of the way in which the deposits were formed.

57. Does not this formation seem plainly to prove that on the side of the eastern bay, the alluvial deposits were not made uniformly and regularly as in Oyster Bay, but that at various periods, bars, similar to the one that is observable today, were created on the bottom of this same eastern bay? And this circumstance, combined with their multiplicity and regular shape, seems to me to give sufficient indication of an origin different to that which one would wish in vain to find in a few reefs of rock, nothing of which provides any traces or remains. All that I have just said here of the active role of the fucus in the filling-up of the eastern bay will soon acquire greater certainty from what I still have to say about the shape and size of these plants (125, 129, 130).

Currents in the eastern bay.

58. It remains for me to forestall an objection: that is, the existence of currents which I assume (52, 53) to assist in the accumulation of the fucus on the bottom of the eastern bay. But if one

pays attention to the enormous quantity of remains of marine animals (72) with which the beach is littered; if one observes that even now, towards the northern end of this same bay, there is an entire whale (72) which, doubtless, was violently carried there by the currents and, being washed up on the shore by them, must have died there; if one studies these frequent heaps of immense fucus (128) scattered over the beach, then one will, I believe, find it difficult to deny the existence of these currents and their direction.

Singular instance of their direction.

59. I could, moreover, cite a more particular instance of both. This instance is sufficiently strange in itself for me to consider it necessary to relate it here. A member of the staff was injured during the night by the cover on one of the lockers in our ship's big cabin. In his anger, he seized the cover and threw it out of the window, into the sea. At that time, we were at anchor, abeam of the entrance to Oyster Bay. It might seem simpler that this cover should have been carried into it...the opposit occurred, for we found it a few days later, washed right to the middle of the head of the eastern bay. It had thus been taken round a large part of the island, solely by means of the currents of which I have spoken (58). Furthermore, what must add to the strangeness of the incident is that the same person who had thrown it overboard was with me then. He recognised it, retrieved it, brought it back immediately and restored it to its rightful position three days after having torn it from it.

Future growth of Maria Island to the north.

60. It is not just to the west (50, 51) and east (52) that Maria Island must increase in size and spread. Nearby, to the north, a small islet has formed. Maria Island already continues out to it by means of a long line of rocks and reefs. These present in actual fact the picture that I have built up from them of the sea's action upon the neighbouring peaks, which preceded them in the painful struggle that they must now carry on themselves (40, 41).

Growth to the north-west.

61. Lastly, there is a final direction in which new acquisitions of territory cannot fail to occur: it is to the north-west of Maria Island. There, a rather large little island is situated. Lying right in the middle of the channel which separates Maria Island from Van Diemen's Land, it could well one day become a means of linking the two. It is beyond doubt, even, that this reunion must take place sometime. But how many more centuries, perhaps, must pass before that period? Mistress of Time, Nature never takes him into account. He is the principal agent in her works, and it is through him that she imparts to them all that character of grandeur and strength that mocks our calculations and schemes.

#### *Fourth Section: Phytological Observations.*

The vegetation is the same as that of D'Entrecasteaux Channel.

62. The nearness of Van Diemen's Land, most of whose vegetable products we had collected, did not allow us to hope that we might find much that was new here; and indeed there was not one among the trees, shrubs and sub-shrubs that we had not already seen.

63. Of the herbaceous plants, there are two which were not known to us and which merit a few remarks on account of their usefulness to the natives. The first of these plants is a species of the graminaceous family (extremely common around Paris) which has a blackish-brown stipe at the top and which, for this reason, is popularly known as the bulrush. As at home, it grows in wet, swampy places, and I found it particularly in the marshes along the northern shore of Oyster Bay. It covers large areas there and provides the natives with an abundant supply of a material well suited to the construction of their light craft; and so all those that I could see along this coast were made exclusively from stalks of this grass.

Description of a particular plant used by the natives for food.

64. A second, more interesting and more useful plant also deserves our attention more particularly. Upon crossing one of the marshes of which I have just spoken (63), I was surprised

by the large number of holes that I noticed in the ground there.

While trying to guess their possible cause, I spotted several large clumps of a plant which also appeared to me to belong, of necessity, to the graminaceous family. I say "appeared", because I was unable to find a single specimen of it, either in flower or in fruit, to guide my efforts to determine precisely the family to which this plant must actually belong. Be that as it may, I realised easily that the wish to obtain its root was alone responsible for the natives digging this great number of holes. Guided by this conjecture, I tried to pull up some of these roots myself. I managed to do so with difficulty, for, without growing deeply, they were creeping and had numerous shoots which were intertwined, thus making it hard to extract them. [The stem] is jointed like that of the sugar cane; and from each joint there grow one or more stalks which, at first sight, rather resemble large rushes, from which, however, they are soon easily distinguished by the following characteristics. Instead of being full of matter, like rushes, they are all completely hollow; though at intervals one can plainly see the signs of a small, circular partition — very thin, resistant, hard and brittle — which is firmly set into the inside of the wall of the stalk itself. Between each of these solid, woody partitions, there are many other weak, membranous partitions of great thinness. Their number varies in each stalk, according to its particular length, and this length itself varies from four to five or six feet.

Qualities of its root.

65. The order to which I suspected this plant must belong made me hope that it might contain some useful substance. I was not mistaken. Upon chewing some of the young shoots growing out of the joints of the root, I discovered them to have the flavour of a raw chestnut. The newest and freshest parts of the root seemed to me to be equally good to eat; but then wanting to taste the oldest roots, I found them almost unbearably bitter. They were not only bitter, but astringent as well, like acorns.

The natives' foresight with regard to this plant.

66. After making this study, I should have had difficulty in not recognising the reason for the numerous holes that I could see in the ground (64); I readily understood that it was simply the desire to obtain the roots that had led the natives to dig them. Furthermore, I had at the same time the opportunity to make some rather curious observations on their foresight. Not only had they not exhausted all the roots in that place (which might have destroyed the plant entirely), but, in their fairly considerable consumption of them, they had also taken care not to strip areas that were too large — which would undoubtedly have made the process of reproduction longer and less successful.

General nature of the vegetation.

67. The growth of the vegetation is generally less vigorous on Maria Island than in Van Diemen's Land (which forms part of D'Entrecasteaux Channel). The eastern coast is too sheer and rocky to be very fertile (34, 35, etc.), and the western one is too sandy and too new (8, 49, etc.). In several places on the latter coast, however, one finds some fair pasture-land; the grass there was plentiful and of good quality. One of these pastures occupies a rather large valley near the head of Oyster Bay, on the southern side; another similar area is to be found beyond the marshes on the northern shore of the same bay; a third, no less excellent pasture, occupies some low ground on the north side of the eastern bay, where a little stream of fresh water runs (16). On this same shore, to the west of the first, there is a second stream, along whose banks one can gather fairly large quantities of sorrel, parsley and a small species of carrot with an agreeable flavour.

N.B. See the supplement to this section — Nos. 126-135.

#### *Fifth Section: Zoological Observations.*

No large quadrupeds.

68. Terrestrial quadrupeds: this island was too small for us to have any hope of collecting any large species of mammal there; we were unable to find a single one. A species of rat, which I have

described under the name of *Mus insulae maria*, is (along with a little marsupial) the only mammal that I was able to obtain. This latter was given to me by the natives; it was still alive. I believe it to be new and have described it under the name of *Didelphis murooides*, on account of its resemblance to Linnaeus's *Didelphis mus*.

No sign of dogs.

69. We could not see a single sign of dogs — not only on this island, but in Van Diemen's Land as well. This observation of the total absence of an animal as useful on the continent of New Holland as it is numerous could lead into the history of man in these lands; but now is not the moment to reflect at all upon this subject.

70. Marine mammals: there were several species of the cetacean family around Maria Island, each of which appeared to be extremely numerous. When circumnavigating the island (32), I had twenty opportunities to observe large herds of porpoise (*Delphinus phocoena*).

71. Seals were equally numerous, not only around the island, but also all along the east coast of Van Diemen's Land connected to Schouten Peninsula. Even so, it was impossible for me to obtain a single one. However, from the study that my friend Faure made of the species that he found on an islet near Van Diemen's Land, it would appear that the little seal (*Phoca pusilla*) also occurs in these regions; and since Labillardière claims to have observed *Phoca monachus* in D'Entrecasteaux Channel, one may assume that the many herds that one sees all along these shores belong to different species.

72. Finally, there is one last species of marine mammal whose existence along these coasts is beyond all question — the whale. The whole shore at the head of the eastern bay is littered with the remains of these huge cetaceans, and I myself, have seen an entire one, half-decomposed, near the northern corner of the head of this bay (58).

#### *Birds.*

73. Birds were everywhere rather plentiful, but they mostly belonged to the same species as those observed in D'Entrecasteaux Channel. We possess some, however, that we had not thus far collected from Van Diemen's Land. Among these are (1) a small species of parrot which I have described under the name of *Psittacus insulae maria*; (2) a species of grosbeak which I have named *Loxia bas-our-erythra*; (3) a species of blackbird which I have described under the name of *Turdus guloflavus*.

74. Among the shore and water birds, we observed wild duck, teal, a black swan, divers, sea-gulls, gannets, cormorants and terns. Since all these species were also to be found in D'Entrecasteaux Channel, and since I have described them all in my *Topography* of that region, I shall confine myself to a few observations upon the physical relationship between the localities and some of the different species just mentioned.

75. Gannets: the species of this genus that one finds on Maria Island is indubitably the same as that in D'Entrecasteaux Channel, which I have named *Sula diemenensis*, but it is far from being as plentiful on the shores of the island as it is in the canal. The reason for this difference seems to me to be easily understood. It obviously resulted from the comparison of this bird's habits with the nature of the seabed and that of the shore. The gannet is especially at home in the midst of more peaceful waters; it seeks out shallower, muddier areas. These were the principal reasons for its seeming to be more particularly relegated to the part of the Channel near Port Cygnet. The sea in this area appeared to be covered with gannets, and when they flew up, the sky seemed (as it were) to be obscured by them. But also, how many powerful attractions must have drawn them thither and established them upon these shores! There are waters perpetually calm and pure, an entirely muddy bottom and numerous shoals of all kinds of fish. On Maria Island everything is different. The bottom of Oyster Bay is too sandy and rocky (50, 51) and so discourages them; the shore and the eastern bay, constantly battered as they are by stormy seas, would be even more uncomfortable for them, and so they shun them.

76. On the other hand, the sinister cormorant, which delights in the breakers and reefs and smiles at the ocean's fury, would have trouble in finding elsewhere a home more suited to its tastes and habits than this horrible eastern coast of which I have spoken so often (4, 7, 33, 34, 41, etc). The rocks everywhere are covered with the dismal legions of this bird; and their plaintive, lugubrious cry, mingled with the din of the waves crashing about them (34, 41).

undoubtedly does much to increase the horror inspired by those very breakers.

77. Terns: The same hold good for the family of terns. As with the cormorant, most of its species — and particularly *Sterna caspia* — are very common all along the eastern coast, living among wild, isolated rocks. Since they are less common in the Channel, it is not surprising that they should be found in greater numbers on the inaccessible coast of the island under discussion.

78. Divers: Divers (*Urinator*) and seagulls (*Larus*) were particularly established in the midst of those vast swathes of monstrous fucus which are to be found at the entrance to the eastern bay and on almost every point of that coast and the northern one.

#### *Oviparous quadrupeds.*

79. Among the animals of this family, I was unable to discover any trace of tortoises, frogs or toads.

80. I have two species of lizard which are exactly the same as two of those I collected in the Channel. I have described a third under the name of *Lacerta scincoides* because of its numerous similarities to *Lacerta scincus*.

#### *Fish.*

81. Apart from the fact that there generally appeared to be fewer fish along the coast than in D'Entrecasteaux Channel, the impossibility of using the seine (because of the nature of the bottom) meant that I could not examine many species of them. The few that I was able to see also belonged to those species that I had already observed in North West Bay. The commonest on Maria Island were that species of *Cottus* that I have described under the name of *Cottus dupetithouardii*, the spotted dog-fish, *Squalus canicula*, and that other species of dog-fish that I have named *Squalus daubenton*. We also caught several spiny dog-fish, (*Squalus acanthias*).

82. General observations: the genus of rays and that of pleuronects, whose species were so numerous and varied in the Channel, seem excessively rare here. The reason for this is simple: two genera equally fond of soft, muddy bottoms could not be plentiful on rocks or a bottom bristling with shellfish (51, 54). The same observation can be applied to the chimaeras, the toad-fish and the star-gazers, etc. I did, however, find that beautiful species of dorado from D'Entrecasteaux Channel that I have described under the name of *Coryphaena salviani*.

#### *Insects.*

83. Insects: I have paid little attention to this class of animals; I shall content myself, therefore, with saying a word about each of the genera that we were able to observe in turn during our excursions.

84. In the driest, rockiest places, one finds the red-winged grasshopper (*Locusta stridula*, Lin.). I had already observed and collected it on the excursion that I had made with Mr Freycinet to the upper waters of the north river [Derwent River] in D'Entrecasteaux Channel.

85. Butterflies are as scarce and have as few rich colours as those in the Channel; they are, in fact, the same species.

86. Ants: there are many fewer ants than in the Channel. One nevertheless finds the fearsome *Formica mordicans*.

87. Bees and wasps: I did not see a wasp (*Vespa*) or a bee (*Apis*) anywhere.

88. Gnats: I have often spoken of damp, marshy places (14, 18, 63, 64). That is sufficient indication that gnats, asilids and midges must abound there. They were indeed very common everywhere and most troublesome.

89. Flies: among the flies (*Musca*), the green fly (*M. carnaria*) was extremely common.

90. Gadflies: I saw a small species of the horse-fly family (*Tabanus*); it was a very dark brownish-grey, rather like Fabricius's *Tabanus fasciatus*.

91. Lice: in spite of their short, frizzy hair, the natives of Maria Island seemed to be extremely

prone to lice (*Pediculus humanus*); at least. I saw them on several occasions occupied in searching each other for them. These creatures appear to have assumed rather the colour of the skin on which they live, for they are a very deep blackish-brown. The natives call these vermin *noure* and designate the action of killing them by the composite name *noure-gana* (see my Van Diemen's Land vocabulary).

92. Amphipods and Isopods: In several places, the shore was covered with sea-lice and sand-hoppers, but I did not have enough time to identify the numerous species apparently belonging to these two genera.

93. In order to conclude my account of the insects, it remains for me to say a few words about the genus *Cancer*, using the name in all its Linnaean generality. Among the rocks that I have described (41) and in the farthest depths of those caves of which I have spoken (34), it is easy to conceive that the largest species of this genus must not only multiply freely, but also reach a gigantic size.

94. These two conclusion (drawn from the study of the terrain) were both entirely supported by experienced, for it often happened that a small number of fishermen, just using lines, and in a few hours, caught so great a quantity of lobsters (*Cancer gammarus*, Lin.) and crayfish (*C. homarus*, Lin.), that it was possible to distribute them generally throughout the entire crew.

95. Upon the beach at the head of the eastern bay, I, myself, came upon the monstrous claw of a crab; the individual to which this redoubtable weapon had belonged must not have weighed less than 30 or 40 pounds. Moreover, these large species supply the natives of these regions with part of their diet. It is the women who dive to great depths for them, and I confess that I can scarcely imagine how they manage to pull from their rocky dwellings creatures so big and so frightfully armed.

96. Be that as it may, one further finds in connection with this genus of animals, a new and striking proof of the influence of nature of the seabed upon the existence of such and such a species, in preference to all others. Lobsters (94), which seek out both holes in rocks and their debris, exist in prodigious numbers around Maria Island; they were generally rare in D'Entrecasteaux Channel and, moreover, only occurred near some more rugged, craggy points.

97. On the other hand, spider crabs (*Inachus*), which delight in filth and mud, abounded to excess on every point in the Channel and yet apparently did not exist around Maria Island. The different nature of its terrain must in fact repel them on almost all the points.

#### *Molluscs.*

98. Without stopping at worms proper, which offered me nothing interesting or new, I pass on immediately to the class of molluscs.

99. From what I have often said both of the nature of the coast and its disposition, it is easy to sense in advance that the species of the family with which we are occupied at present must have been generally rare, and that the species observed must also have been those whose habits made them more at home among rocks. In this connection, experience agrees with argument, for if one excludes a solitary species of jellyfish (which I have described under the name of *Medusa hexachremona*), the genera of sea-anemones, sea-squirts, starfish and sea-urchins are the only ones that I was able to examine; and apart from the fact that their species were not very numerous, one knows well enough that the conformation of these creatures and the toughness of their outer layer make them more liable to inhabit less peaceful places.

100. Sea-squirts [*Ascidians*]: I recognised three species of this genus. The first is Muller's *Ascidia clavata*, very common everywhere; the second is *Ascidia rustica*, as common as the preceding one; and the third species appeared to be a new one. I have described it under the name of *Ascidia tetrapsoma* (see *Fasciculus Zoologiae Hollandiae-novae*).

101. Sea-anemones: I saw three species of this genus as well. The first, *Actinia crassicornis*, is very common everywhere; the second, *Actinia viridis*, is rarer than the preceding one; and the third appeared to me to be new. I have described it under the name of *Actinia chromhemata*.

102. Starfish: I was able to see only two species of starfish, both of which I had already found in the Channel and had described — one under the name of *Asterias endecactes*, the other under the name of *Asterias zigrinata*.

103. Sea-urchins abounded on the southern shore of Oyster Bay, and we found many tests of a species that we had not so far observed

104. I was forgetting to mention a last genus of mollusc, of which I found several specimens at the head of Oyster Bay. It is the one that we pulled up from the bottom of the sea abeam of Cape Leeuwin and which is often discovered washed up on the shore here. I have described the genus as new under the name of *Dalphonsia*, and the species was the same as that of Cape Leeuwin, which I have designated *achronos* (see my work entitled *Fasciculus Zoologiae Hollandiae-novae*, no. 111).

#### *Shelled molluscs.*

105. The number of species of shellfish that I was able to gather on Maria Island does not go above 35 to 40; and with two or three exceptions, I had already had specimens of them all since the Channel, which alone provided me with more than one hundred species. This difference in numbers between these two areas must largely arise from the difference in the length of our stay in each one.

106. A circumstance which nevertheless strikes me as rather odd is that the commonest species in the Channel were the rarest at Maria Island and vice versa. Thus it is that in the latter place I was able to find only one example of that species of trochus which covered the shores of the Channel and was particularly to be seen in such abundance toward the head of Port Cygnet.

107. It was the same with *Turbo sulcatus*, which was as common as the preceding shellfish on almost every point along the Channel and scarcely to be found on Maria Island.

108. *Buccinum speciosum*: On the other hand, that charming whelk, whose brilliant colours with their variety of shades rightly attract the epithet *speciosum* and which barely existed (always in small numbers and a very poor state) on a few points along the Channel — that whelk, I say, was so common on the northern shore of Oyster Bay, that a few moments were sufficient at low tide to gather millions of it.

109. *Turbo enchromus*: The same applies again to that pretty, little species of turban shell that I have named *Turbo enchromus*. I was able to find only a few remnants of it in North West Bay in the Channel, but it exists in great numbers on the northern beach of the eastern bay and towards its head.

110. *Cassidea punicea*: There are, besides, a few species that I did not find in the Channel, two of which are remarkable for their delicacy and elegance. The first is a species of helmet (*Cassidea*), the size of an egg and a beautiful golden colour.

111. *Tellina striatulata*: The second is a species of *Tellina*, dazzling white, excessively thin and whose valves are elegantly striped.

112. [No entry.]

113. *Tiboconus albus*: I have not been able to relate to any of Linnaeus's genera a third kind of univalve shell that I collected myself on the shore at the head of the eastern bay. It evidently comes from a species of mollusc which is shaped in such a way as to hold this shell completely hidden in its own substance. I have named it *Tiboconus albus*.

114. Mussels: Mussels, which in several places along the shore of the Channel appeared to form complete reefs, were only to be found in insignificant numbers around Maria Island, and the species was much smaller.

115. *Haliotis gigantea*: Finally, at Maria Island we found the two mightiest, and also the most useful, shellfish of these regions. I refer to abalones and oysters. The former species, described by Chemnitz under the well-deserved name of *Haliotis gigantea*, is much rarer here than in certain parts of the Channel; it is even more so in Oyster Bay than in the eastern bay, where it is found in greater numbers at the foot of the bluff of the tomb. This important shellfish deserves, moreover, to hold our attention for a few moments.

116. Difficulties in obtaining this shellfish: I must observe first of all that however common it may be on any part of the shore, it is always difficult to obtain a specimen, for it lives under the deepest

rocks which one can scarcely reach except by diving. It is excessively rare to find any living ones, even at low tide; and in [these waters] they are always very [small].

117. As far as the way in which the natives prepare this shellfish for eating is concerned, it is as simple as it is quick. Over a wide bed of live coals, they spread out as many abalones as are needed either for the family or for a single person. They leave them there long enough to reach the required degree of baking and then remove them. At that moment the animals separate easily from their tests. The natives eat them like that, without any kind of seasoning. Having served as plates throughout the meal, the shells (themselves half-burnt by the fire) are then thrown away. Mr Freycinet and I had the pleasure of being present together at a meal of this kind beside the hut of young Ouré-Ouré's family, at the head of Port Cygnet.

118. With regard to the nature of this kind of food, it is not only succulent and wholesome, but agreeable and even delicate as well. In fact, all the deepest-lying part of the animal, far from being tough and leathery, offers a soft, white and very parenchymatous flesh. Finally, there is, in some of these animals, a particular organ consisting of a fatty, oily, yellowish substance that is rather like the soft roe of a young carp and appears to be exquisitely delicate.

119. This particular organ (118) is not found in all shellfish. Would it therefore be a real distinction between sexes...? We were in too great a hurry then for me to have the time to make the necessary observations in that regard, and I have since not had another opportunity to undertake them.

120. As for the species of oyster that I reported (115) to exist on Maria Island, it must actually be related to *Ostrea edulis*. But it belongs to the biggest varieties of this species, those whose size ranges (according to Linnaeus himself) from three to four inches and even more, for one finds some truly monstrous examples of it. There is furthermore, no need to remark that oysters abound in the bay that bears their name (50). The ground is paved with them, and their large remains contribute not a little to the rapid blocking-up of the head of the bay (51).

121. These shellfish, along with the preceding species (115), form the principal resource of the natives of this land. The good quality of their flesh, combined with their volume, makes them doubly valuable in this connection. Going by some of my own observations, I have reason to believe that the natives prefer abalone to oysters.

#### *Zoophytes.*

122. I have only a few words to say about this family. So important in the tropics (see my *Topography of the Bay of Kupang*), it is almost entirely unknown here. We barely observed two hard species, and they were both, moreover, so insignificant that there would be scarcely any need to talk about them, were it not for my intention to omit nothing of all that I was able to gather or observe.

123. *Millepora cellulosa*: The first of these hard zoophytes, then, is a species of the genus *Millepora* — the one known commonly as Neptune's cuff (*Millepora cellulosa*). Its colour is a very deep shade of gold. One pulls it up in its entirety from the seabed and finds fragments of it on the shore.

124. *Retipora hexaedripora*: The second species of hard zoophyte appeared to me to be new. It forms on the leaves of *Fucus giganteus*. I have described it and named it *Retipora hexaedripora*.

125. Calcareous concretion: Apart from those two species, one finds in great abundance at several places along the shore, a sort of calcareous, stalactitic concretion which could perhaps, at first sight, pass for a species of zoophyte. But upon examining it more closely, one readily recognises that this completely inorganic substance results from a kind of excretion produced by a group of vermicular (creatures), upon which these concretions have formed and to which they all perfectly adhere.

#### *Soft zoophytes.*

125.\* Sponges: I found no more varieties of soft zoophytes than I did of hard ones (122). The sponge genus was the only one, even, of which I was able to obtain a few species. I have five, which I have described under the names of *Spongia trupheros*, *S. ophidiformis*, *S. ochraceorufa*, *S. semi-cava* and *S. punicea*. I collected most of them on the beach at the head of Oyster Bay, where they had been washed up by the waves.

*Supplement of the Fourth Section.*

126. *Fucus giganteus*: The genus *Fucus* plays too active a part in what I have said of the geological history of Maria Island (45, 46, 53, 54, 55, 57, 58) for it not to be necessary to dwell on it more particularly than I have done. The most common species — and also the largest — is undoubtedly *Fucus giganteus*. This is the one upon which I needed to make more particular observations.

127. It is rare upon the western coast and is not even found at the entrance to Oyster Bay, nor in its entire depth. The reason for this is simple: the floor of this bay is too sandy and too shifting.

128. For the opposite reason, all the eastern coast — particularly the north-eastern one — is covered with it in every sense of the word. It is no less plentiful at the entrance to the eastern bay and is everywhere of prodigious dimensions.

129. These dimensions are such, that on the north-eastern coast I encountered several specimens which measured no less than 22 fathoms in length — that is, more than 130 feet.

130. With regard to its enormous quantity, it would be difficult for me to give a more singular proof of than the following fact. We were moving along near the east-north-east point, at a speed of almost three knots. Suddenly, we chanced to come upon a swathe of *fucus* which so completely halted our boat, that not only was it impossible to continue in the direction that our observations made necessary, but we also had great trouble in extricating ourselves from this far-reaching bank of weed.

131. *Fucus palmatus*: This species is much rarer on the coast of Maria Island than it was in the Channel. I only saw a few feet of it on the eastern side. The natives make the same use of it — that is, as drinking vessels.

132. Apart from these species of *Fucus* (126-131), there were many others which carpeted the sides of rocks and which each wave left exposed. The most common were *vittatus*, *alcicornis*, *dissectus*, *serratus*, *viscidus* and *corymbiferous*.

133. *Conferva bullosa*: In these rough seas, the muddy bottom and stagnant water-loving *Conferva* was unlikely to offer very many species. I saw only one, which appeared to me to be *Conferva bullosa*. It was on the northern side of the eastern bay and made the rocks along the shore (on to which the waves had washed it) excessively slippery and dangerous.

134. The mosses and mushrooms belonged to the same species and those that I had already collected in the Channel, except that they were less varied and less plentiful — a circumstance which appeared to me to arise from the too-rocky or too-sandy nature of the soil (67).

135. Lichens are rarer in the interior and on the trees, but very numerous along the coast and on the pebbles of the sea-shore. Their abundance in a few places is such, that all the rocks seem to be their colour: a very intense fiery red here, a very bright sea-green there — elsewhere, a dazzling sulphur-yellow and, at other points, a very dark blood-red. On closer inspection, one can easily see that these various shades are produced by lichens — *flammeus*, *thalassinus*, *sulphureus*, *hematochromus*, etc.

## NOTES ON PÉRON'S NATURAL HISTORY OF MARIA ISLAND

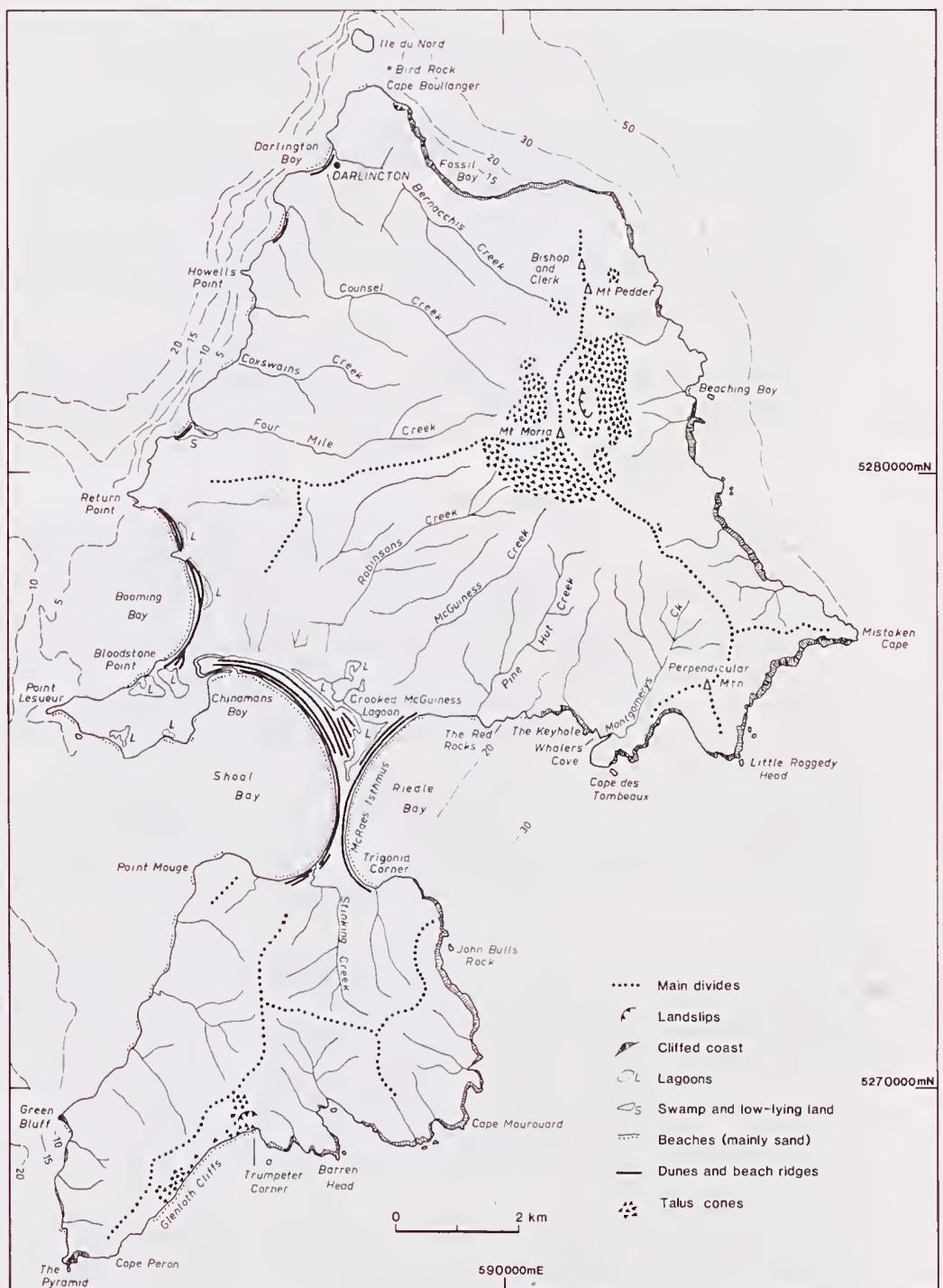
### *First Section: Physical and Meteorological Observations.*

1. The position for Maria Island 42°42' south and 145°50' east (of Paris) is remarkably close to its position as understood today. Maria Island extends from 42°34'S to 42°40'40"S and from 148°0'30"E to 148°10'E; note that Paris is approximately 2°20'E of Greenwich.
3. As noted by Péron the shape of Maria Island is very irregular. On the broadest scale it consists of two former islands joined by a tombolo. The outline of neither part of the island shows any distinct major geological control. The western coast is sub-parallel to the faults which divide the island almost meridionally, and Glenloth Cliffs are almost parallel to the main fault. The other coasts cut across the geological grain. On the whole the outline gives the impression that the island is of relatively recent origin and that its outline does not yet reflect an equilibrium between exogenetic processes and the rocks of which the island is composed.
4. A valid and, in view of the geomorphological asymmetry of Maria Island, significant comment.
5. Some of the comments here seem invalid. The fetch from the north-west is only about 10 km but occasional strong winds blow from that direction (Table 3). The fetch from the north is close to 60 km, and from the NNE (Schouten Island) about 30 km; strong winds from those directions are common at Tasman Island and therefore probably at Maria Island. Protection from winds from the northerly quarter would be slight. A slip of the pen might be postulated to explain the comment about protection offered by the coast of Tasmania from south-easterlies. To the south-east there is no protection. There may be some protection from southerly winds by the Forestier Peninsula but most of Maria Island lies east of the coasts of the Forestier and Tasman Peninsulas. The suggestion of a slip of the pen is supported by some comments in "11".
6. The likely wind pattern for Maria Island is dealt with in the comments on the climate.
7. The east coast of Maria Island is precipitous — but not so much as a direct result of strong easterly winds, although some undoubtedly do occur (see Table 3B) but as a response to the very energetic wave action resulting from swell produced by local storms and by free swell from distant storms in the Tasman Sea.
8. The west coast is generally lower and less rugged than the east partly because the upper parts of a dolerite sheet with the superincumbent, readily erodable sandstone beds have been dropped along the major fault and are now close to sea-level, and partly because wave action is less energetic than that on the east coast. The lower wave energy is a result of the smaller fetch (4 to 15 km) west of the island.
9. The ruggedness of the southernmost part of the island results partly from the frequency and continuity of steep joints in the Jurassic dolerite, partly from the fetch of waves (not wind directly) from the south-west (15 km) and south (hundreds of kilometres).

There are several place names in the archives of the Baudin expedition which differ from those of the completed maps. Cape Basalt is one of them, and is probably Cape Raoul. Cape Hauy is found therein named Cape des Organistes.

10. Cape des Sarcelles, another manuscript name, is Cape Bernier. See also comment "5".
11. Note the reference to winds from the south and more particularly the south-south-east. No temperature figures are available for the island but temperatures are unlikely to be very different from those at Orford (see Table 1).
13. Mist on the mountains at morning and evening can frequently be seen today.
14. The low-lying parts of Maria Island are marshy close to the junction of a number of west-flowing streams with the sea. The area of Crooked McGuiness Lagoon is particularly noteworthy in this respect.
15. The comments about lack of fresh water on the island are valid and would appear markedly so in late summer and early autumn (see Table 2) when the exploration of the island was made. The rainfall is between 600 and 700 mm but is variable. The major streams possibly flow continuously but some streams certainly do not. Springs are rare.

As noted by Péron, the nature of the bedrock, granite in many places, also reduces the likelihood of springs.



MAP 3

16. In Péron's text the word used through is *source* to designate the flows of fresh water. He nowhere refers to a visit to a spring, or to seeing one. Moreover, all the texts refer to water flowing from a spring, that is, the course of a stream. *Source* has therefore been translated as *stream* throughout.

Péron's statements about the two streams on the northern shore of Riedlé Bay need some clarification. Confusion has arisen because they seem to place the two streams in the wrong order, with Pine Hut Creek flowing into the sea near Cape des Tombeaux and Montgomerys Creek closer to the head of Riedlé Bay.

Because it was thought possible that Péron's statements in the definitive manuscript (1B043), which was composed after the discovery ships reached Port Jackson, might differ from those of the draft (1B042), which was compiled shortly after the Maria Island study had been carried out, this section of the draft was translated —

Streams of the eastern bay.

They are two in number and both of them are on the northern shore of this bay. The first is to be found at the foot of Bluff of the Tomb; it is the larger, its water being fresher and of better quality. It flows abundantly enough even in the season we experienced here, which must be the driest, so that it could be obtained in a sufficiently large quantity, but it would be necessary to anchor at the entrance of the eastern bay, which would be extremely dangerous.

The second stream, closer to the point than the first, is to be found at the head of a little cove, narrow and very safe for a boat. It flows down a little valley of some depth, which helps to conceal it. It is even further concealed by the manner in which it ends; indeed, it loses itself in the sand fifty or sixty paces from the head of the little cove in question, so that one must proceed some distance from the shore to see it. But although the water may be plentiful enough, it flows over accumulated plant debris and so is less pleasant than that of the Bluff of the Tomb; it is, however, perfectly sweet and quite fresh.

It is clear that there are no differences of fact between the two manuscripts.

Where then does the confusion lie? The crucial word in the statement is the meaning of *point*. One probably identifies it automatically with Morne du Tombeau (Bluff of the Tomb) and Cape des Tombeaux (Cape of the Tombs); but perhaps it has not this meaning. Nowhere else than here is the Bluff/Cape referred to as a *point*.

There is little doubt that Péron discovered the tomb at the time of the landing in Riedlé Bay when it was visited during the circumnavigation. However, it is clear that his detailed examination of the tomb took place during one or more visits to the site in company with Lesueur. To reach it then the two men would have walked across the neck separating Riedlé Bay from Shoal Bay, coming from the discovery ships anchored off Point Mauge, 'the point which forms its entrance' (17).

If this were the point from which Péron described the relative positions of Montgomerys Creek and the Pine Hut Creek, the whole description falls into place. Montgomerys Creek is now correctly placed at the foot of Cape des Tombeaux, and had an abundant flow even in the dry year the visitors were experiencing. Montgomerys Creek runs for some distance in granite before it reaches the shore (Clarke *et al.*, 1981), flowing over granite with potholes and depressions, surrounded by "very coarse-grained granite with superb crystals of feldspar" (24). The creek enters the sea at the head of a little narrow cove, Whalers Cove.

The other stream is Pine Hut Creek. Péron describes it as flowing in a little valley which helps to conceal it and ending by losing itself in the sand fifty or sixty paces from the shore flowing across piled-up plant debris.

Some points about the tomb are of interest. One of them is that Cape des Tombeaux is named Bluff of the Tomb — singular — in the draft. The other is that three circles are shown on the contemporary sketch map (Map 1) as the situation of this feature. In point of fact, there was only one tomb there, the three circles representing the three stages of its examination — the whole tomb, the cover in part removed and the ossuary.

17. The 'very small' stream in Oyster Bay (Shoal Bay) is Stinking Creek. The point forming the entrance to that bay is Point Maugé.

18. The marshes on the north side of Oyster Bay are the Crooked McGuiness Lagoon. The marshy area has a superficial cover of sands and clayey sands (Baillie, in Clarke & Baillie 1984:24) on Permian or older rocks. Water draining the area north-east of the marsh is channelled along four streams — Robinsons Creek, McGuiness Creek and two others — but dissipates by flowing into the superficial deposits near the inland boundary of which the streams terminate. The water soaks through the superficial deposits to the sea, producing the marshy area. The superficial deposits were formed as part of the tombolo at an early stage in its development.

21. The table of meteorological observations is interesting in that it seems to record the passing of a low pressure system (Pluviôse 30, Ventôse 1), a high (Ventôse 2/3) a more intense low (Ventôse 5) and then a second high (Ventôse 7). The temperatures recorded, the minimum 10.8°C (midnight, Ventôse 5), to the maximum of 15.0°C (18.00 hours, Ventôse 1) are rather low for late February (Pluviôse) and early March (Ventôse), the maximum falling below the range recorded recently at Orford (Table 1).

#### *Second and Third Sections: Mineralogy and Geology*

##### THE SCIENTIFIC BACKGROUND

To appreciate the explanations offered by Périon of geological (including geomorphological) phenomena some background of European understanding of Earth History of that time is useful. Lehmann in 1756 had postulated that the first-formed primitive rocks were higher than the stratified deposits flanking them and derived from them by a universal deluge (the Noachian Flood) which gradually receded depositing younger and younger rocks at lower altitudes and over smaller areas. Arduino (1760) divided the stratified rocks into Primitive, Secondary and Tertiary, the Primitive being unfossiliferous schists, granites and volcanic rocks, the Secondary were layered richly fossiliferous limestones, marls, clays and some other sedimentary rocks, and the Tertiary highly fossiliferous rocks derived, partly at least, from the Secondary. The most influential student of the earth in the last three decades of the eighteenth century was Werner (1787). He taught that primitive rocks were the first precipitates from a universal ocean, the transition rocks were mostly chemical precipitates and only partly mechanical deposit containing a few fossils and formed when conditions became less chaotic, that later rocks (the Flotz-Schichten and then the Alluvial rocks) were successive precipitates and that volcanic rocks were youngest and due to the combustion of coal in the Earth's crust leading to local melting of adjacent rocks. Werner's followers were sometimes referred to as neptunists in reference to their belief that granites were primordial rocks, precipitated from the universal ocean. One of these, von Buch (1814) studied some of the rocks collected during the Baudin expedition.

Increasingly opposed to the neptunists from 1788 onwards were the plutonists, followers of James Hutton's postulate that granites resulted from cooling of a molten mass of rock injected into earlier rocks and therefore not primitive, not primordial. In 1788 Hutton published his "Theory of the Earth" in which the inductive method of enquiry into the Earth was used to great effect and the need to appeal to unknown phenomena and causes greatly reduced if not eliminated from geology by the application of the Principle of Uniformity — the constant appeal to analogy with present processes and their products. Hutton's work was made popular by the publication in 1802 of *Illustrations of the Huttonian Theory* by Playfair but this publication would not have been in the hands of the French scientists with Baudin. They adopted a strictly Wernerian approach.

A major contribution to knowledge of Van Diemen's Land occurred during the voyage of Baudin's vessels *Naturaliste* and *Géographe* during 1802. Baudin's expedition carried a number of naturalists, two of whom, at least, Bailly and Depuch, had some training in geology (von Buch 1814:235), and another, Périon, a zoologist who published the account of the expedition.

Depuch, according to von Buch (1814), was a student of the famous crystallographer, Hauy.

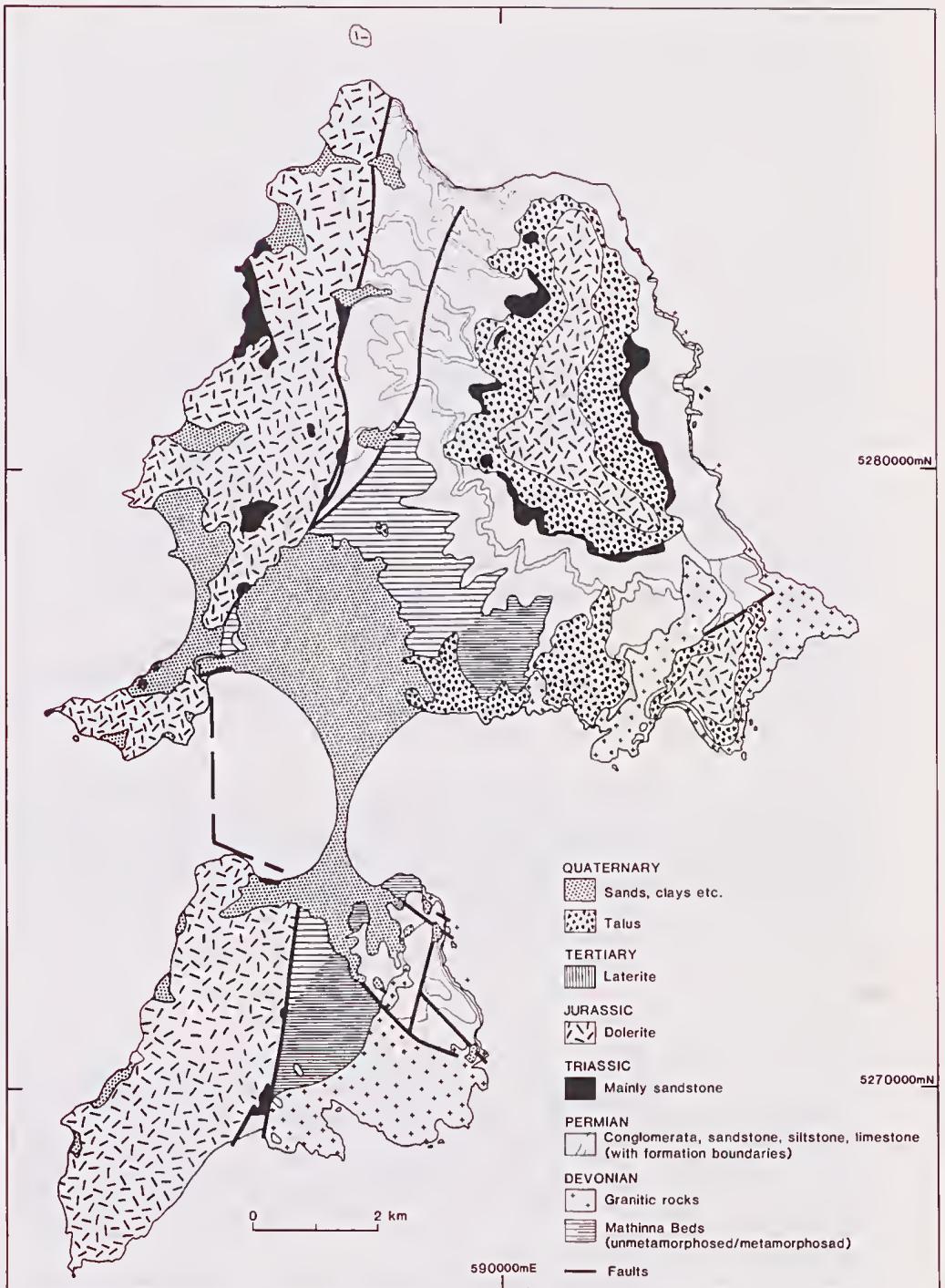
The use of the term 'granite' by the French naturalists Péron, Bailly and Depuch, for an obviously crystalline rock whether light or dark in colour, is confusing to the modern reader and might be quite misleading to anyone without local knowledge. They used 'granite' in the stonemasons' sense. The term may have come from the latin *granum* — a grain, through the Italian *granit* (Johannsen, 1939, vol. 1, p. 254). A contemporary French dictionary (Garner 1802) described granite as 'pierre forture', (i.e. very hard rock) and this would cover most of the rocks called granite by the French naturalists.

The excellent work done by Baudin's naturalists was consolidated in 1814 when the great German geologist, von Buch, published his notes on the collections made by Depuch and Bailly. Von Buch studied their collections in Paris in the winter of 1810 during the period of the Grand Empire of the Napoleonic Wars. Depuch and Bailly had apparently prepared a very good catalogue (von Buch 1814: 125) which allows some of the localities to be better identified. Von Buch described the mineralogy and texture of many of the rocks in the collection and gave them names more in keeping with modern usage e.g. gabbro and basalt. Von Buch described several of the granites in some detail and included a comment (p.239) made by Depuch that the granite from Maria Island was the oldest rock they had seen in the region, probably on the basis that it had the coarsest grains (a Neptunist concept).

## PRESENT UNDERSTANDING OF THE GEOLOGY

Having provided a brief comment on the concepts current in Europe concerning Earth history at the time the French naturalists were studying the natural history of Maria Island, it would be useful as further background to provide an up-to-date statement on present understanding of the geology of the island (see fig. 2).

The oldest rocks, the Mathinna Beds, consist of interbedded pale quartzites and dark phyllites exposed at Trigonia Corner, in the vicinity of Pine Hut Creek and along the eastern coast north of Mistaken Cape. The coastal outcrops north of the Cape show with great clarity that these, probably Early Devonian, rocks have been folded into anticlines and synclines and then intruded by a suite of granitic rocks, probably Late Devonian in age. The intrusions take the form of veins, dykes, sills and irregular transgressive bodies. The folded rocks and granites are overlain on an angular unconformity by almost horizontal conglomerates, sandstones, siltstones and limestones, many of them richly fossiliferous. These horizontal rocks which are mostly marine are Permian in age. The folded rocks, granites and Permian rocks all crop out east of almost meridional faults which cut both parts of the island. The faults drop Triassic sandstone intruded by almost horizontal sheets of Jurassic dolerite down to the west, from their position above the Permian rocks east of the faults to sea-level west of them. The dolerite caps the highest peaks in both the northern and southern part of the Island and forms most of the western coast as well as the eastern coast from Cape Peron to Trumpeter Corner. The closely spaced jointing at Return Point and the granophytic development around the Point Lesueur peninsula noted by Clarke and Baillie (1984:26) suggest proximity to the roof of the intrusion. The minimum gross throw of the faults between Mt Maria and the west coast is thus at least the height of Mt Maria i.e. a little over 700 m. The main rocks of interest younger than the dolerite are the blood-red laterite (ironstone) of probable Tertiary age at Bloodstone Point and the unconsolidated sands of the beaches and especially of Macraes Isthmus which are probably Quaternary. Of palaeoclimatic interest are the talus deposits which flank the dolerite of the Mt Pedder-Mt Maria ridge and Perpendicular Mountain as well as those of the Glenloth Cliffs, which latter originate at just over 200 m a.s.l. Talus bodies, now disconnected from their source, occur on the spur east of McGuiness Creek at about 80 m a.s.l. and on the spur east of Pine Hut Creek at about 120 m a.s.l. These talus deposits are probably Late Pleistocene.



MAP 4

## THE COLLECTIONS

While the ships were at Maria Island, from late on 18 February to the morning of 27 February (Plomley, 1983), both the geologists, Charles Bailly and Louis Depuch, were away with exploring parties. Early in 19 February Bailly went off with Faure to survey the Schoutens. They returned about midday on 26 February. Depuch went ashore on 19 February with Baudin and Bernier to examine Oyster Bay. On 20 February Depuch went off with Henry de Freycinet and Bernier to examine Marion Bay. They returned on the morning of 26 February. It will be seen that neither Bailly nor Depuch would have had the time for an intensive survey of the geology of Maria Island, so that the report must largely represent Péron's observations. However, it seems likely that Depuch made some observations, because the accounts here and in Péron (1807) differ in small ways.

There is a list of Bailly's collection of rocks made during the Baudin expedition (Archives Nationales, Marine Series, 5JJ.56). This lists twelve specimens from Maria Island, all but one of them 'granits'. However, this is no indication that Bailly himself spent much time on Maria Island, or that he collected the specimens listed, because the specimens could have been given him by Péron, or by others who visited the island — there was a rule to the effect that material collected went to the specialist in the subject as a matter of course.

While Péron's observations were accurate his explanations of the origin and relationship of rocks were not, as he (and Depuch at least) used Wernerian principles unswervingly and uncritically. Veins and other apophyses from the granitic bodies well exposed in the cliffs along the eastern coast of the island quite clearly cut across the layering in the Mathinna Beds, the Primitive sandstone (24) and the spatial relationships are such that the granitic rocks must be younger than the sandstone. It was relationships such as those so clearly shown on Maria Island that Hutton (1794) used to demonstrate that some granites are younger than some sedimentary rocks thus overturning the Wernerian system. Further Péron had noted (ms 18041, note 4) that sandstone occurred below granite (actually dolerite) along the eastern face of the island. This should have alerted Péron to the fact that not all holocrystalline rocks ('granite') were older than all sedimentary rocks as required under Werner's world view. Perhaps we shouldn't be too hard on Péron — Hutton's views did not become widely known until after the French expedition left France and Péron, although a very good natural philosopher, was a zoologist rather than a geologist.

With so much effort expended by Péron and others upon studies of geology and mineralogy during the Baudin Expedition, it is indeed unfortunate that it had no impact or only very little upon geological science or upon studies of Tasmanian geology, even on such studies in the early nineteenth century. Admittedly, Wernerian dogma was already being replaced by the Huttonian view, but in Tasmania itself it has taken more than 150 years for it even to be realised that a great many geological observations of interest had been made there in 1802.

## MINERALOGY: THE TEXT

22. The mineral products (i.e. rocks of Maria Island) are varied, contrary to Péron's comment. Some varieties of granitic rocks, several sorts of metamorphic rocks and old sedimentary rocks, and considerable variety of younger sedimentary rocks and the dolerite are present on quite a small island. Péron's comment is understandable in view of the time he spent and in view of the state of knowledge of rocks at the time. It was general practice then to regard any coarsely crystalline rock as granite, whereas today we would recognise many different rock types within the coarsely crystalline group. It is interesting to notice that the rocks described were collected by Péron himself.

23. "Medium-grained, dark green granite" is the Jurassic dolerite. When Péron applied the name "granite", he was using the term in the sense then current — "a holocrystalline rock with visible grains". The prevalence of dolerite at sea level around much of the island probably led Péron to regard it as the "foundation of all the lowest rocks". The comment about the shingle of

the southern shore of the eastern bay being "green granite" is puzzling. The southern shoreline is reddish granite. On the other hand dolerite shingle is prominent on the shore beneath Glenloth Cliffs further south on the eastern shore and Pérón may have telescoped his observations.

24. "The superb granite" — the "very coarse-grained granite" of Pérón we still call granite. The localities given are correct except that the "lofty peaks of the north-east corner" are dolerite.

Pérón's published description of the granite (1807:299) lists correctly the minerals in the granite. Again the influence of one of the mineralogists, probably Depuch, is evident in view of the comment at the end of the paragraph. Von Buch (1814) gave a short description of the granite and noted that Depuch considered it the oldest rock seen in the area. This age determination was probably made on the basis of the grainsize, it being considered, following Werner (1787), that the coarser-grained a crystalline rock, the earlier it precipitated from the enveloping global ocean. The granite, probably Devonian, intrudes into and is therefore younger than the "primitive sandstone" (see "25") if by that term is meant the Mathinna Beds.

25. The "primitive sandstone" may be either or both of the folded Mathinna Beds (probably Early Devonian) intruded by the granite or the sub-horizontal Triassic sandstones which, along the western coast lies in low areas between dolerite hills and forms several reefs especially near Howells Point. On balance, the first alternative is favoured because the terms "hard, compact" apply to it rather than to Triassic sandstones and the Triassic rocks are clearly, even from a distance, horizontally bedded, a feature Pérón is unlikely to have missed.

The Mathinna Beds crop out in a spectacular fashion on the east coast north of Mistaken Cape and are accessible by land near Trigonia Corner. Ms 18041 contains a paragraph (10) on "zigzag strata" not mentioned in the other manuscripts. These strata are probably the folded Mathinna Beds so clearly exposed in the cliffs north of Beaching Bay. Pérón's explanation of their form as due to deposition over irregularities does not survive examination of the outcrops and is invalid.

26. The "Secondary sandstone", noted as forming all the horizontal layers, was seen by Pérón on the east coast lying at heights of more than 200 or 300 feet directly beneath masses of "granite" (=dolerite) and surrounded by outcrops of granite (ms 18041). Pérón referred to them in that manuscript as "of tertiary origin". In ms 18042 they are referred to as "limestone", which some of them are.

The term "secondary sandstone" probably covers the almost horizontal Permian and Triassic sedimentary rocks which include calcareous layers. Pérón probably inferred them to be calcareous through the presence on and beneath them in cliff faces and sea caves of stalactites. Had he examined them at close quarters he would have seen and could not have failed to remark upon the abundance of fossil shells for which the rocks are widely known. The published text (Pérón 1807:299) reveals a couple of other observations — that they occur capping granite cliffs along the east coast and that their origin may be attributed to a long suite of calcareous deposits, this second comment being especially applicable to the stalactitic and travertinous surface deposits on the cliffs along the east coast — deposits which may be seen from a boat.

27. "Petrosilex" was the current technical name for flint or a fine-grained siliceous rock. The Permian Counsel Creek Formation, which occurs in the headwaters of Montgomerys Creek above Cape des Tombeaux, contains abundant chert nodules, fine-grained siliceous rocks, sufficiently resistant to attrition to survive transport down the creek.

28. The most spectacular outcrop of red iron ore is on Bloodstone Point. The iron minerals accumulated in the B soil horizon due to intense weathering of the underlying dolerite, probably in the Tertiary Period. A typical lateritic profile is developed in the cliffs at Bloodstone Point.

The rock was used by the Aborigines as a source of red ochre. It has subsequently been used as a clay for cement making and more recently it has been quarried for use as a road aggregate (Clarke & Baillie 1984).

30. The differing nature of the sands on the eastern and western sides of the tombolo results partially from differences in offshore slope and marine ecology on the opposite sides of the tombolo. The shallowness of the western bay is reflected in its name (Shoal Bay), the abundance of shell-fish in the bay (and from the shell-fish, the shells on the beach) in its former name (Oyster Bay). Much kelp accumulates even today on the northern end of the beach at the head of Riedle

Bay.

31. Pérón was right about the siliceous stones and volcanic substances but calcareous rocks (limestone) are abundant on both north and south Maria although not very close to places where a boat could be easily beached.

## GEOLOGY: THE TEXT

33. The "general idea" here expressed by Pérón was that popular at the time due to its espousal by Werner (1787). In this world view the globe was originally enveloped in an ocean from which crystals formed to produce "granites" with a tendency for the grainsize to be smaller in successive layers.

The Wernerian view was challenged by James Hutton (1788, 1795) but Hutton's views did not become generally accepted for several decades after they were first promulgated and the French "savants" were clearly Neptunists.

34. "Ramparts of granite" are the steep dolerite and granite cliffs of the east coast. Deep tunnels have been excavated by the sea in both rock types and are particularly noticeable in the dolerite just north-east of Cape Peron. They were noted by Pérón (1807:274) near Mistaken Cape in granite.

36. The calcareous sandstone "manifestly Tertiary in origin" was possibly called Tertiary because it was richly fossiliferous. However, if the specimens he saw were fossiliferous it is very surprising that Pérón did not remark upon the fossils as he did in several places close to the Derwent estuary. The horizontality may have influenced him to call them "Tertiary".

37. The horizontal layers referred to are the rocks of the Parmeener Supergroup (Permian). The observations that they are "at the same height" on both points of Riedle Bay is valid within the limits of accuracy available to Pérón and very close to true even using modern information.

38. Pérón's comment that the horizontal layers were formerly submerged beneath the waves is true because most of the Permian units contain marine fossils. However, Pérón did not have this evidence (not available until 1830 (Ross's Almanack: 1830; and later George Frankland, Surveyor General, reported abundant fossils near Darlington in 1836) and based his comment on general Wernerian principles. His belief in the generality of the Wernerian view comes through clearly in the rest of the paragraph, especially in the last sentence. Pérón touched on one of the underlying difficulties in the Wernerian view when he wrote "This is not the moment...on the causes of this recession of the seas". The recession of the seas on the scale required could not be reasonably explained.

39. Many of the comments made on paragraph 38 also apply here.

40. A clearly Wernerian view. Depuch clearly thought the granite the oldest rock (see comments on paragraph 24).

41. This is an ingenious (and wholly invalid) attempt to explain the rugged nature of those high parts of Maria Island composed of dolerite. The rugged nature is the result of frost action. The terraced nature of The Pyramid is due not so much to changes in sea-level and marine processes, although the latter may have had some effect, but to sub-aerial processes, probably largely frost-action during the Last Glacial Stage, acting on a rock with well-developed vertical and sub-horizontal joints. The Pyramid was noted (Pérón 1807:263) to be "granitic" (dolerite).

The Pyramid lies off Cape Pérón, the most southerly point of (South) Maria Island.

42. Reference here to the "Other rock" is to Bird Rock; the "small islet" is île du Nord off Cape Boullanger, noted by Pérón (1807:275, 277, 296) as granitic (dolerite).

43-47. An application of the Wernerian view of the history of the Earth to Maria Island.

48. There is no evidence that the west coast of the island was enlarged by the debris resulting from breakdown of rocks by wave action. Most of the west coast is dolerite, some is Triassic sandstone, a fluvial deposit, and the rest is mainly sand, which except for the tombolo, forms

mainly pocket beaches.

49. The "fragments of Van Diemen's Land" which produced the isthmus are grains of sand, mainly quartz but with some shells and shell fragments especially on the western side. Sandy beaches, except that on the east side of McRaes Isthmus, occur on the west coast of the island, the coast sheltered from ocean swell and waves. The origin of the quartz is not clear. Some of it probably is derived from the Triassic sandstone which crops out in places along the coast, some from Triassic sandstone and Permian sedimentary rocks which are drained by streams debouching on the west coast. The contribution of quartz from the breakdown of granite on the east coast to the sands is unclear but at most, this source can contribute now mainly to the east-facing beach on the isthmus. The mass of sand in the isthmus and surrounding low-lying areas has not yet been adequately explained.

50-53. Pérón noted (50) that the floor of Oyster (now Shoal) Bay is very favourable to the building up of alluvial deposits but later (52) commented that progress of growth of the isthmus into Riedle Bay may be more rapid than into the western bay. The number of beach ridges and their arrangement on the isthmus and adjacent low-lying areas strongly suggests that maximum growth has been into the north-eastern part of Shoal Bay (see earlier). Such relative growth is consistent with the relative intensities of wave attack.

53-54. The influence of bull-kelp (*fucus*) in building the beach to the east was exaggerated by Pérón. Although large accumulations of kelp are formed during storms, they are removed, mainly by biological activity, within a few years and contribute little to the final volume of the beach. Pérón recognised the association of bull-kelp with a rocky bottom as opposed to a sandy substrate which supports oysters better.

55. The reference to a frightful bar is intriguing but of unknown significance. The suggestion that the bar is due to a mass of fucus buried beneath sand is unlikely to be true. Aerial photographs of Riedle Bay show no sign of any significant shallowing of the bay offshore. The frightful bar may have been an offshore sand bar built up temporarily by storm (and/or current) activity. That a big storm or storms had occurred shortly before Pérón's visit is suggested by the large accumulation of sea-weed on the beach.

56. The beach ridges on the isthmus were noted by Pérón as "several rises...in a line parallel to the shore"

57. The suggestion that the bar could be formed in the same way as the present isthmus may well be valid. Knowledge of the position, shape and composition of the bar would be necessary to establish its origin.

58. The large number of whalebones reported by Pérón on the beach of Riedle Bay is notable. His descriptions do not allow a choice to be made between beaching of live animals, flotation and then stranding of dead animals or, most unlikely, the transport by bottom current and then washing ashore of bones originally deposited on the bay floor.

59. An extraordinary occurrence and almost incredible. However, by examining the meteorological table it may be seen that it is conceivable that a locker cover thrown overboard during the night of 29 Pluviôse would drift south and east before the wind until the afternoon of 30 Pluviôse and then drift north until early on Ventôse and be driven ashore before an easterly or south-easterly on 2 Ventôse. If the locker cover was thrown overboard by Midshipman Mauroard, he would have been with Pérón a few days later in Riedle Bay and been able to recover it. The locker may have started its journey on 3 or 4 Ventôse but on wind directions and the fact of its recovery, this is less likely. The French ships anchored, for at least part of their stay, off Point Maugê.

61. The little island "lying right in the middle of the channel" is Lachlan Island. It was noted by Pérón (1807:277) as being "granitic". It is composed of dolerite.

#### *Fourth Section: Phytological Observations*

Péron's knowledge of systematic botany was probably slight, and such information in the report on Maria Island in all likelihood was obtained from Leschenault, who was one of the savants with the Baudin Expedition and was a trained and competent botanist.

The botanist Leschenault did not return to France with the expedition, and did not publish anything about his botanical collecting in Australia; nor did any of the others who made such collections there. Leschenault's herbarium, and probably those made by others, were handed over to Labillardière, who was about to publish his *Novae Hollandiae plantarum specimen*, to disappear, as it were, into that pit, becoming so mixed with it that the untangling of the mixture and the correction of its mistakes of locality is still a problem for students of Australian botany.

For information about the botany of Maria Island see: Brown and Bayly-Stark: *Vegetation of Maria Island* (1979); Labillardière: *Novae Hollandiae plantarum specimen* (1966); Plomley: *The Baudin expedition* (1983).

63. Bulrush: This was probably *Eleocharis sphacelata* but perhaps *Typha* sp. The use of the stems of this plant by the natives for the construction of their canoe-rafts (Plomley, 1983), was probably limited largely to the craft constructed at Maria Island, because in few other localities would the bulrush have been sufficiently abundant. Bark was used under such circumstances.

64. Edible reed: probably *Phragmites australis*. The planned cropping of this plant is of particular interest.

67. The occurrence of natural pasture land on Maria Island is noteworthy. The usual explanation for the presence of clear land in pre-settlement Tasmania is that it had arisen as a consequence of human activity, the Aborigines burning off the bush in order to promote grasses on which the kangaroo and its kind, important contributors to the diet, could feed. However, there were no kangaroos or other large herbivores on Maria Island, and so the grasslands there could not have arisen in that way. Grasslands are to be expected as normal in vegetation: there is no necessity to postulate a human cause for them. This is not to say that some grasslands have not arisen, or been kept open, by human endeavour, because there are many accounts of the native practice of burning off the bush, an activity so ingrained in habit as to have been normal, that is, an explanation should be sought for the purpose of this activity. Was it practised to keep assembly grounds free from vegetation? or to promote the growth of grasses in savannah so that the kangaroo would come there, such an environment being an easier one in which to hunt than open country (where the Aboriginal would be at a disadvantage, especially in the absence of the dog)? or to keep open pathways between this place and that?

The explanation of fire resistance and other characters of the vegetation of Australia as being a consequence of human firing could well be correct in the long term, but too little notice has been taken of the normal environmental factors which control vegetation, in particular rainfall. The idea of the overwhelming importance of human firing in the formation of the Australian vegetation is so simple that no other explanations have been sought. But nothing is simple.

Plant species do not occur uniformly in a landscape but occupy it in accordance with a local environment to which they are suited. Quite apart from such general controls as altitude and climate, plants are distributed in space in accordance with the characters of the place. Where water lies, as in swamps and on the margins of lakes, only grasses and sedges occur, partly because excessive water is not a habitat in which trees can grow and partly because of cropping by ducks, wallabies and other creatures. And so with other parts of the landscape, their vegetation is of the forms most suited to grow in them. In this way there is formed a mosaic of vegetation types over an area; and this mosaic changes with time in accordance with the penetration of new forms into it, or the establishment of new balances as with the replacement of eucalypt by myrtle in many Tasmanian forests.

As for the three plants which Péron mentions as being found along the banks of a stream, sorrel was probably *Oxalis corniculata* L., parsley *Apium prostratum*, and the carrot *Daucus glochidiatus*.

126. *Fucus giganteus*: *Macrocystis pyrifera* (Linnaeus) C. Agardh. Péron's comments on the type of environment in which this kelp occurred are in keeping with his understanding of their

mutual relationship.

131. *Fucus palmatus*: a synonym of *Durvillea potatorum* (Labillardière) Areschong. This is the bull-kelp.

132. The six species of *Fucus*, *alcicornis*, *corymbiferons*, *dissectus*, *serratus*, *viscidus* and *vittatus* are indeterminable, and *nomina nuda*.

133. *Conferva bulbosa* = probably *Enteromorpha bulbosa*.

134. Mosses and mushrooms: not identifiable. Pérón's notes on collections made at D'Entrecasteaux Channel have been lost.

135. The lichen which Pérón mentions as growing abundantly on the rocks at the seashore of Maria Island is a species of *Caloplaca*. This or a similar lichen are very common in the same situation at least all along the eastern coast of Tasmania. The names of the four species *flammeus*, *hematochromus*, *sulphureus* and *thalassimus* are *nomina nuda*. Pérón was interested in the lichens and made a collection of them.

For the first three of his species, Pérón has chosen names signifying their colours, flame-coloured, blood-red and sulphur-yellow, and for the fourth "marine".

#### *Fifth Section: Zoological Observations*

Pérón's work as a zoologist was superb, for he not only understood the importance of exact description of the organism, but he could see the various species as parts of the environment in which they lived. Ecology in his time had been but little noticed by biologists and, in fact, had not even been named as a special study until 1855 when the German zoologist, Ernst Haeckel, applied the term to the relationship of an animal to both its organic and inorganic environments. The study had had a much longer history than that, having its beginnings in the natural history of Aristotle. By the late eighteenth century, students of natural history had come to understand that there was a definite interrelationship between the organism and the living and non-living environments in which it lived. Pérón was the first to deal with Tasmanian natural history in such terms.

#### *Mammals.*

It is of interest that Pérón found "no large quadrupeds" on Maria Island. It seems too much to believe that when the island became separated from the mainland there were none there, and it must be concluded that they were soon eliminated either because the territory was too small to support a breeding population, or because the Aborigines had killed them off. "It is suspected" that pademelons (*Thylogale billardieri*) and Bennett's Wallaby (*Macropus refogriseus*) were on the island at the time of European contact (Steve Brown, pers.com.). However, Pérón's statement throws doubt on this; and so does Brown's failure to find even a single fragment of bone in a survey of forty sites on the island, though here the possibility of the survival of bone in such situations must be given consideration.

68. *Mus insulae maria*: Probably the *Hydromys chrysogaster*, described by Geoffrey Saint-Hilaire in 1805. This is the type specimen.

*Didelphis mus* Linn.: Probably Pérón is referring to *Didelphis murina* Linn., an opossum living in the region Central America southwards to Brazil.

*Didelphis muroides*: *Antechinus minimus* Geoffroy (1803/04); the type specimen.

From MS 18041 we learn that the rat was found by Lesueur; and the little *Didelphis*, which Pérón preserved in alcohol, was given him by a native during an interview.

69. *Dogs*: There is no doubt of the absence of the dog from Tasmania when first it became known to Europeans, an absence which had given rise to occupational and social differences between the Aborigines of Tasmania and those of mainland Australia. A report dealing with Pérón's observations on the dog was published by Cuvier (1808).

The different times at which draft and final copy were composed is made clear in differences

here. Draft 18041 reads as follows in relation to the absence of the dog from Tasmania —

We saw no trace of the dog, not only on the whole of this island, but also in all other parts of Van Diemen's Land that we had visited up to the present. This observation is all the more interesting because these animals are, it is said, very common in New Holland. It could perhaps be presumed that the inhabitants of Van Diemen's Land are not, as Solander makes out, originally a colony of New Holland, for without doubt the settlers of that country did not fail to transport with them an animal which for twenty different reasons was extremely useful to them; but putting aside in-fact all injudicious conjecture, there is no doubt that we will find many opportunities to verify this and to discover to what extent it can be so.

The observations are all the more interesting because Péron's remarks on the occurrence of the dog in New Holland imply that he had not so far seen it there. Yet before visiting Tasmania Péron had spent two and a half months on the western coast of Australia. Were no dogs seen with the Aborigines there? Was the dingo regarded as being unrelated?

The reference to Solander has proved troublesome to place. Apart from co-authorship with Banks of an account of Cook's first voyage, Solander does not seem to have been the author of any work on Cook's voyages. However, he was involved in editorial work in connection with them, acknowledged on the title pages of some of the German editions of Cook's *Voyages*. In the present case, the matter attributed by Péron to Solander is to be found in Captain King's account of Cook's third voyage (pp. 114-117).

70. The dolphin (porpoise) *Delphinus phocoena* is *Tursiops truncatus*.

71. This reference to Faure has not been identified certainly, but was probably his journey of 19-26 February when the ships were at Maria Island to explore Schouten Island and Freycinet Peninsula. Faure set out on 19 February, and the next day he passed close to Ile des Phoques, which was covered with seals (Plomley, 1983, p. 69). More information about the episode is to be found in draft 18041: there were several hundred seals on the little islet, that is, the identification with Ile des Phoques becomes nearly certain. Faure shot one of the animals, and it seems clear that it was an eared seal (*Otaridae*). However, Péron did not see the specimen, presumably because it was not possible to preserve it during the week that Faure was away.

It is a matter of conjecture what species of seal were to be found on the coasts of Tasmania and the islands of Bass Strait before the coming of Europeans. Péron was much interested in the group, but then he was interested in so many things. Moreover, identifications were based on northern hemisphere species; and Péron's writings on the subject have been lost. Péron mentions Labillardière's identification of *Phoca monachus*, and himself identified *Phoca pusilla*.

*Phoca monachus* — probably *Neophoca cinerea* (sea-lion).

*Phoca pusilla* — probably *Arctocephalus tasmanicus* (fur-seal).

#### Birds.

Péron's treatment of the zoology generally shows a much greater interest in marine forms than in species from land habitats. This may reflect a particular interest in marine life, but it was the marine environment, especially that of the shore, which provided him with the best opportunity for studying differences in the characteristics of its inhabitants. Two groups, the birds and molluscs, provided Péron with subjects for particular attention, and show us his qualities as a biologist, for it is clear that he understood the intimate relationships between species and the habitats they occupied.

The section of the birds, like those on other zoological groups, is brief but concerns largely questions of the factors controlling the presence of species. There is little difference between draft and definitive account, although if anything land forms receive less attention in the draft — in the section on birds, land species are not even mentioned. The draft also records in passing the sighting of a large sea-eagle and many pelicans.

73. *Psittacus insulae-maria*: not identified.

*Loxia basourerythra*: *Emblema bella* (Latham) — Fire-tail Finch.

*Turdus guloflavus*: *Lichenostomus flacicollis* (Vieillot) — Yellow-throated Honeyeater.

75. *Sula diemenensis*: *Sula serrator* Gray.

77. *Sterna caspia*: *Hydroprogne tschegreave strenua* (Gould).

78. Diver (*Urinator*): probably the Diving Petrel *Pelecanoides urinatrix* (Gmelin).

In the discussion in MS 18041 it is pointed out why the cormorant was so much more common around Maria Island than at the Channel, as were the seagulls and terns, while the gannets were exceedingly common at D'Entrecasteaux Channel but rare at Maria Island. For Pérón this was quite understandable when the habits of those animals were compared with the nature of the sea-bottom and shore.

*Oviparous quadrupeds*.

80. *Lacerta scincoides*: not identified.

*Lacerta scincus*: not identified.

MS 18041 refers to three species of lizard, two of them common in the Channel, and the third *Lacerta buanos* which had been found there on the Iles Steriles, and was more rare at Maria Island. Eight species of lizards have been recorded from Maria Island.

*Fish*.

MS 18041: the most common fish were *Cottus variegatus* (named *C. dupetitouardii* in final report) and that beautiful species of dorado (sea-bream) which Pérón named *Coryphaena cabanis*. The latter was to be found in the midst of *Fucus*; its flesh was very good. Only two specimens were collected of the species described by Pérón under the name *Squalus daubenton*.

*Cottus dupetitouardii*: *Bovichthys variegatus* Richardson.

*Squalus canicula* Linn.: *Scyliorhinus canicula* Linn.

*Squalus daubenton*: *Emissola antarctica* Gunther.

*Squalus acanthias*: *Squalus acanthias* Linn.

*Coryphaena salviani* (*C. cabanis*): perhaps *Acanthopagrus butcheri* (Munro) "Silver Bream".

*Pleuronectes* spp.: flounders.

*Insects*.

84. The red-winged grasshopper which Pérón found on Maria Island and indentified as *Locusta stridula* Linn. was probably *Gastrimargus musicus*, the Yellow-winged Locust.

86. The formidable *Formica mordicans* was probably the Bulldog Ant *Myrmecia forficata*: doubtfully the Jackjumper *Myrmecia pilosula*.

88. The asilids or robber-flies belong to the dipterous family Asilidae.

89. The green fly *Musca carnaria* was one of the blowflies (*Calliphora* spp.) — see Labillardière, entry for 13 May 1792.

90. The horse-flies or march-flies belong to the dipterous family Tabanidae. The *Tabanus fasciatius* Fabric. which Pérón saw has not been identified, but is likely to have been a species of *Dasybasis*.

91. Lice: Pérón called them *poux de tête* in MS 18041, and he also remarked that the Aborigines were as skilful in seeking them as in killing them.

Pérón mentions the human louse very briefly in his report on the Aborigines of Maria Island (Plomley, 1983, pp.73, 74, 86). For a general account of the human louse see G.H.F. Nuttall, who published a series of papers on the anatomy, biology and variation of this louse in the Cambridge journal *Parasitology* between 1917 and 1920.

*Crustacea*.

94. Crayfish and lobsters — there is a confusion over the popular names of two similar marine forms. In Europe the following names are used:

*ecrevisse* — crayfish: freshwater forms corresponding to the yabbies of Australia.

*hombard* — lobster: a marine form characterised by having two great claws. This form is not found in Australian waters.

*langouste* — spiny lobster: it is the *langouste* group to which the Australian 'crayfish' and 'lobster' belong, and there are two species of the genus *Jasus* in eastern Australian waters.

*Jasus verreauxi* occurs chiefly on the coast of New South Wales, and is found much less commonly in Tasmanian waters. In New South Wales it is known as the 'lobster'.

*Jasus lalandii* is the common species in Tasmanian waters. Its name in this region is 'crayfish'.

*Cancer gammarus* (lobster) and *Cancer homarus* (crayfish) should be interpreted in the above terms.

95. The 'monstrous claw of a crab' was that of the Giant Crab *Pseudocarcinus gigas* (Lamarck).

#### *Soft molluscs.*

Here Périon has assembled a number of unrelated forms — medusae, sea-anemones, ascidians, starfish and sea-urchins.

99. MS 18041: among the medusae, Périon saw on two occasions a very large and very beautiful species which not only differed from those previously described by others but also from those described by himself. He gave the name *Medusa rosea* to the species, with a Latin description. Apparently between writing the draft and making the final copy, Périon changed his mind about its name, now calling it *Medusa hexachremona*.

The species has not been identified.

100. MS 18041: *Ascidia clavata* Muller was present in exceedingly large numbers wherever there were whole rocks.

*Ascidia rustica* was also found on several parts of the coast; Périon saw it at the head of Oyster Bay.

A third species, named by Périon *Ascidia tetropsoma* was very abundant adhering to the debris of oysters. A Latin description is given.

None of the above species has been identified.

101. None of the species of sea-anemones has been identified.

102. MS 18041: in D'Entrecasteaux Channel two species of *Asterias* were seen on sandy beaches; and in Oyster Bay they had a similar habitat. Both species were unknown to Périon, who described them under the names *Asterias endecactes* and *Asterias zigrinata*, but neither is determinable.

103. Sea-urchins: in MS 18041, Périon remarks that the shells of a sea-urchin were found abundantly along the shore of Oyster Bay, and that they all belonged to a species he had already found at D'Entrecasteaux Channel which was characterised by the very constant number of eleven spines. A Latin description of the species is given: it has not been identified.

104. Périon's *Dalphonsia achronos* has not been identified.

#### *Shelled molluscs.*

105. It is surprising that Périon did not notice shells of *Neotrigonia*. It is common at the southern end of Riedle Bay, giving the name Trigonia Corner to a small bay there. He had been enthralled to discover a trigonia shell, a 'living fossil', at Adventure Bay, Bruny Island (Fleming, 1964) only a week or two before he visited Maria Island.

106. The trochus which Périon found so abundantly at D'Entrecasteaux Channel is likely to have been *Bankivia fasciata* (Menke).

107. *Turbo sulcatus* is likely to have been *Subninella undulata* (Lightfoot), but perhaps was

*Micrastraea aurea* (Jonas).

108. *Buccinum speciosum* was probably either *Nassarius pauperatus* (Lamarck) or *Cominella lineolata* (Lamarck), but perhaps *Nassarius nigellus* (Reeve).

109. MS 18042: Pérón found a charming little species of *Turbo*, describing it under the name of *effulgens*, but changed the this name to *enchromus* by the time of writing the final report. Pérón gave it the first name because of the glitter of its shell. Only debris of the shell was found at the Channel, but it occurred in very large numbers in Riedle Bay, on its southern shore in particular, though it was difficult to find specimens which had not been abraded. The species was probably *Phasianella australis* (Gmelin), but may have been *Micrastraea aurea* (Jonas).

110. Only one specimen of *Cassidea punicea* was found, in Riedle Bay. The species was probably *Phalium semigranosum* (Lamarck).

111. *Tellia striatulata* was either *Gari livida* (Lamarck) or *Tellina albinella* (Lamarck).

113. MS 18042: only four specimens of *Thibocinus albus* were found, Pérón gives a Latin description of his new species, which may possibly have been *Philine angasi* (Crosse and Fischer).

Pérón goes on to mention that *Voluta zigzagata* was not common at the Channel, but was very abundant towards the entrance of Oyster Bay, on its northern shore. The species is not determinable.

114. Two species of mussels occur at Maria Island and form 'reefs'. They are *Mytilus edulis planulatus* (Lamarck), and the smaller *Xenostrobus pulex* (Lamarck).

115. MS 18042: at Maria Island were to be found two shellfish of the greatest importance in Van Diemen's Land, *Haliotis gigantea* and *Ostrea edulis*. Not only is their flesh delicate but they provide at all times a sufficient supply of food for man. *Haliotis* was rarer at Maria Island than at the Channel; at Maria Island it was to be found most abundantly in Riedle Bay, especially at the foot of Cape des Tombeaux. It need hardly be said that although common it is difficult to obtain because it is found only on the deepest rocks.

118. The 'yellowish organ' was the male gonad.

120. MS 18042: oysters were found in large quantities not only at Maria Island but also in various parts of the Channel. At Maria Island oysters did not seem to occur in Riedle Bay.

The oyster was probably *Ostrea angasi* sowerby.

*Zoophytes*

122. MS 18042: the nature of the bottom, everywhere sandy or granite, did not lead to the hope of finding many specimens of hydroid corallines.

123. MS 18042: the specimens of *Millepora cellulosa* Linn. found at Maria Island were of a deep yellow colour. The Tasmanian species had not been determined.

124. MS 18042: *Retriporia hexaedripora* was very common on the fronds of *Fucus giganteus*. A Latin description of this new species is given but is not determinable.

125. The vermicular creature is likely to have been a Serpulid (Annulata).

*Soft zoophytes*.

125\*. All Pérón's names of sponges are *nomina nuda*.

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#### BOULLANGER'S MAP OF MARIA ISLAND

The earliest map of Maria Island was that of its discoverer and namer, Abel Tasman. His 1642 map bore only a faint resemblance to the true shape, opposing bays about the middle of the length of the island being the only similarity to modern maps (and then quite faint). Matthew Flinders, in his circumnavigation of Tasmania in 1798-99, stood too far out to sea in passing Maria Island to make accurate observations and his map shows details of the "Oyster's Bay" area

(i.e. Mercury Passage and Maria Island) from a map by Capt. J.H. Cox who visited the area in July 1789 in the ship *Mercury*. The map was published by Mr Dalrymple in London in 1791. Baudin sent Boullanger to check the accuracy of Cox's map. Cox's map was much better than Tasman's and more nearly approaches modern maps in outline. However, the lengths of both the northern and the southern parts of the island were foreshortened relative to their widths.

The map produced by Boullanger and published as his in 1812 is without doubt that of Maria Island and is remarkably good for three days' work in an open boat. There are, however, some clear differences between it and modern maps.

A comparison can be made between the outline on Boullanger's map and that of a modern map, e.g. the 1:100,000 map of the Department of Lands. In making the comparison the voyage can be considered as made up of six legs, the length of the shortest, Cape Lesueur to Cape Maugé, used as a standard length and the trends compared for each leg. The comparison is tabulated below:

LEG	Boullanger's Map (compared with a modern map)	
	DISTANCE	TREND
Cape Maugé to The Pyramid	too long (7%)	12° clockwise
The Pyramid to Cape Mauroard	too short (14%)	7° anti-clockwise
Cape Mauroard to Mistaken Cape	too long (6%)	9° anti-clockwise
Mistaken Cape to Cape Boullanger	too short (34%)	1° anti-clockwise
Cape Boullanger to Cape Lesueur	short (3%)	13° clockwise
Cape Lesueur to Cape Maugé	standard length	15° clockwise
also		
maximum length (C.B. to T.P.)	too short (9%)	
maximum width (C.L. to M.C.)	too short (112%)	
angle between maximum length and maximum width		3° anti-clockwise

The distances which were too long were only 6% and 7% too long, but one distance which was too short was too short by 34% (Mistaken Cape to Cape Boullanger). This explains the overall shortness (N-S) of Boullanger's map. It is interesting to note that for all legs on the east coast the trends on the French map are all anti-clockwise (by between 1° and 9°) whereas those on the west coast all clockwise (by between 12° and 15°). A constant, undetected current could produce such distortions (Dr A. Sprent, *pers comm.*). If there was a current from about south-east the Mistaken cape to Cape Boullanger leg would be about right for trend, but appear much shorter than it really is. A current velocity of about one-third of apparent boat velocity (as logged from the boat) would produce the apparent shortness noted above. Such a velocity is not implausible. Such a current would also produce the differences noted in the other trends, assuming Mauroard steered the boat by compass.

In detail, the outline of the leg Cape Maugé to The Pyramid is similar as far as Green Bluff but the trend from Green Bluff to The Pyramid is well off. The outline of the coast from The Pyramid to Cape Mauroard is shown by Boullanger as far too straight and the parallelism of east and west coasts not revealed. From Cape Mauroard to the beach at Riedle Bay the coastline is shown too long and too straight and Trigonia Corner is shown too far north. The east-west extent of the northern shore of Riedle Bay is not as long as it should be and the coastline from Cape des Tombeaux to Mistake Cape too straight. The comment on simplicity applies also to the outline from Mistaken Cape to Cape Boullanger and the indentation, Fossil Bay, hardly appears. The final part of the coastline on Péron's map, Cape Boullanger to Cape Lesueur and Oyster Bay, is reasonably accurate.

The worst distance discrepancies were on east coast legs, the worst bearing discrepancies on the west coast legs. The total effect is an anti-clockwise rotation relative to the mid-point of the Cape Lesueur-Point Maugé leg and a narrower, shorter island. However the orientation of the long axis of the island shown on the French map is very close indeed to that shown on modern maps.

The French retained a couple of names from earlier maps, e.g. Baie des Huitres (Oysters' Bay), a name deriving from Captain John Cox in the *Mercury*, and Cape Mistaken. Four features named by the French received descriptive names, i.e. Île du Milieu, Île du Nord, Cape des

Tombeaux and La Pyramide, six were named for expeditioners, i.e. Pointe Lesueur, Pointe Maugé, Cape Pérön, Cape Maurouard, Bai Riedlé, and Cape Boullanger. Subsequently Oysters' Bay has been renamed Shoal Bay and Île du Milieu renamed Lachlan Island.

On Boullanger's map of Maria Island in the atlas produced by Freycinet (1811) the topography of Maria Island is suggested by hachuring. The asymmetry of the northern part of the island comes out well and Ned Ryan's Hill appears. On the southern part of the island, Big Hill is recognisable at Bottom Hill and a hill west of Cape Maurouard may be depicted. The scale shown on the map gives a figure very close to the real one for the distance from Pt Lesueur to Cape Maugé.

TABLE 1  
TEMPERATURES  
ORFORD 1968-1987

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Maxima												
Highest	24.5	24.3	22.8	20.5	17.4	15.2	14.4	16.9	18.5	20.1	22.3	22.6
Average	22.3	22.5	20.8	18.9	16.0	13.5	13.3	14.2	15.8	17.7	18.8	20.2
Lowest	20.2	20.6	19.4	16.8	14.8	12.4	12.3	12.4	13.5	15.0	17.1	18.3
Minima												
Highest	13.3	13.8	12.1	9.5	7.4	5.5	4.3	4.9	7.0	7.7	10.5	11.4
Average	11.3	11.7	10.3	8.0	5.8	3.7	2.9	3.7	5.1	6.7	8.8	10.0
Lowest	10.0	10.2	8.4	6.5	4.1	1.8	0.6	2.5	3.5	5.3	7.2	8.6

TABLE 2  
RAINFALL AND RAINFALL EXTREMES

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Darlington (74 years)	47	51	52	56	57	65	57	55	47	57	56	69	669
Chinamans (13 years)	39	42	65	54	46	67	59	40	48	43	47	76	626
B. Rainfall extremes — Darlington (72 years)													
H/M	3.6	4.8	3.4	5.0	5.1	4.9	3.8	4.1	3.5	2.9	2.5	4.3	
M/L	11.25	52	10.2	27.5	57	5.6	7	27	7.7	7.1	7.1	13.2	

"H/M" is the ratio of the highest rainfall to the mean rainfall over the period

"M/L" is the ratio of the lowest rainfall to the mean fall over the period

TABLE 3  
INCIDENCE OF STRONG WINDS

	A. Orford (1968-86)			A. Tasman Island (1965-1977)				
	km/hr	31-40	41-50	>51	km/hr	31-40	41-50	>51
N		2	—	—	N	76	60	30
NE		14	3	—	NE	19	16	9
E		1	—	—	E	11	7	11
SE		12	3	—	SE	3	6	5
S		1	—	—	S	32	22	20
SW		11	—	1	SW	98	94	94
W		2	1	—	W	51	31	30
NW		8	1	2	NW	34	20	4

Numbers shown are total number of times wind of the velocities and directions shown were blowing at times of observation (900 and 1500 hours each day).

### MAPS

1. Map of Maria Island: to this map have been added the following from sketch maps of the Baudin Expedition —
  - (a) the course taken by the boat on its journey round the island on which Péron accompanied Boullanger
  - (b) two sites of tombs (*tombeaux des naturels*), one between Pine Hut Creek and Montgomerys Creek, and the other to the east of Stinking Creek, above the southern shore of Shoal Bay.
2. Boullanger's outline map of Maria Island.
3. Geomorphological map of Maria Island based on map and aerial photograph analysis with some ground control.
4. The Geological map of Maria Island simplified from that of Clarke & Baillie (1981).

### TABLES

1. Temperature data for Orford 1968-1987.
2. Rainfall data for Maria Island.
3. Wind direction and velocity data for Orford and Tasman Island.

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